Volume 37 · Part 3 · March 1958

REVIEW OF APPLIED MYCOLOGY

COMPILED FROM WORLD LITERATURE ON
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YAMAMOTO (W.), OYASU (N.), & TAKIGAWA (K.). **Studies on the wilt disease of Broad Bean. I.**—*Sci. Rep. Hyogo Univ. Agric.*, **2**, 1, pp. 53–62, 1 fig., 1955. [Japanese. Abs. from English summary. Received 1957.]

Broad bean wilt and root rot in Japan [cf. **28**, p. 107] is associated with infection by *Fusarium avenaceum* (Fr.) Sacc. f. *fabae* (Yu) Yamamoto comb. nov., *F. oxysporum* f. *fabae*, *F. solani* f. *fabae*, and *F. graminearum*.

LEACH (L. D.) & SEYMAN (W. S.). **Localized fungicide placement for control of Garlic white rot.**—Abs. in *Phytopathology*, **47**, 9, p. 527, 1957.

Improved control of *Sclerotium cepivorum* on garlic [**35**, p. 381] with $HgCl_2$ at 12 lb. or PCNB at 25 lb./acre was obtained by spraying into the furrow containing machine-planted garlic. Dusting with PCNB similarly was also effective.

MORTON (D. J.). **Investigations on the curly dwarf virus disease of Globe Artichoke.**—Abs. in *Phytopathology*, **47**, 9, p. 529, 1957.

[Cynarus] curly dwarf virus was thermally inactivated at 55–60° C., aged *in vitro* at 19° in 2–3 days, and had a dilution end point 10^3–10^5, depending on the source. Electronmicrographs showed flexuous rods averaging $581{\cdot}8 \times 15{\cdot}4 m\mu$ in infected sap. The disease was most active at 13° and 19°, and absent at 30°. The host range included sunflower (chlorotic lesions with light necrotic margins), *Centaurea cyanus* (necrotic veins and twisted shoots), and zinnia (local leaf lesions within 7–10 days, necrotic, with dark borders), previously reported as a systemic host.

SCHNATHORST (W. C.). **Microclimates and their significance in the development of powdery mildew of Lettuce.**—Abs. in *Phytopathology*, **47**, 9, p. 533, 1957.

Measurement of R.H. with wet and dry thermocouples connected to a Leeds and Northrup potentiometer gave data indicating that the microclimate extended by 2 hr./day at most the macroclimatic period favourable for germination of conidia of *Erysiphe cichoracearum* on lettuce leaves (R.H. 95–99% at 25° C.), but the disease is mainly influenced by the macroclimate.

BESEMER (A. F. H.). **Enige proeven met chemische middelen ter bestrijding van Sclerotinia minor Jagger in Sla.** [Some tests with chemical remedies for the control of *Sclerotinia minor* Jagger on Lettuce.]—*Versl. PlZiekt. Dienst Wageningen* 129 (*1955*), pp. 161–162, 1956. [English summary. Received Oct. 1957.]

The increasing incidence of *S. minor* on lettuce in the Netherlands [**36**, p. 632] is attributed to the substitution by nurserymen of thiram for brassicol as a soil treatment against *Botrytis cinerea* [cf. **36**, p. 559]. Thiram is ineffectual against *S. minor*, which was well controlled, however, by a combination of brassicol super, applied to the soil at 40 g./sq. m. on 2 April (3 days before planting) and spraying with 0·5% hoe 2652 (also based on PCNB) on 20 April and 3 May, incidence of infection being reduced from 14·3 to 0·9%.

In a further test the soil was treated on 8 July, 4 days prior to planting, and the crop was sprayed with hoe 2652 as before, resulting in a reduction of infection from 52 to 7%.

GROGAN (R. G.), ZINK (F. W.), HEWITT (W. B.), & KIMBLE (K. A.). **Some studies on the nature of the cause of big vein of Lettuce.**—Abs. in *Phytopathology*, **47**, 9, p. 522, 1957.

Roots of lettuce plants infected by big vein [virus: **36**, pp. 298, 446] were rendered

non-infectious by 10 min. surface sterilization with 5:1000 NaOCl and 1:1000 $HgCl_2$ or semesan, but not by 1:100 vancide 51, nabam, or captan. Plants removed after 8 weeks in infested soil, washed, and treated with 1:2000 $HgCl_2$ for 10 min. did not develop symptoms in sterilized soil, though without treatment they generally did. The causal agent settled to the bottom of a 1:1 soil and water suspension, stood overnight, and passed a 40 μ-pored filter, but not one with 14 μ pores. Surface scrapings from affected roots were infectious, but not portions from the interior.

IVANOFF (S. S.). **The Homegarden Cantaloupe, a variety with combined resistance to downy mildew, powdery mildew, and aphids.**—*Phytopathology*, **47**, 9, pp. 552–556, 3 fig., 1957.

A new cantaloupe melon, resistant to *Pseudoperonospora cubensis* and *Erysiphe cichoracearum*, is described from the Mississippi Agricultural Experiment Station, State College.

DUNLEAVY (J.). **A previously undescribed virus disease of Soybean.**—Abs. in *Phytopathology*, **47**, 9, p. 519, 1957.

A virus disease of soybean similar to, but shown by host range and cross protection tests to be distinct from, bud blight [tobacco ring spot virus: **36**, p. 69] also occurred on neighbouring *Setaria viridis* and *Melilotus alba*. The host range differed from that of cucumber mosaic virus only on certain Leguminosae. Symptoms additional to those of bud blight are necrosis of pod sutures and subsequent splitting of pods along the sutures, angular necrotic areas on the pods falling out as the latter grow larger. The virus proved to be seedborne. Greenhouse symptoms on soybean were indistinguishable from those of tobacco ring spot virus.

YAMAMOTO (W.), YOSHITANI (K.), & MAEDA (M.). **Studies on the Penicillium- and Fusarium-rots of Chinese Yam and their control.**—*Sci. Rep. Hyogo Univ. Agric.* **2**, 1, pp. 69–79, 2 fig., 1955. [Japanese. Abs. from English summary. Received 1957.]

During storage, tubers of the Tukune variety of Chinese yam (*Dioscorea batatas* f. *tukune*) develop rots caused by *F. solani*, *F. oxysporum*, and a new species, *Penicillium sclerotigenum* Yamamoto, which is described; it somewhat resembles *P. gladioli* and *P. italicum*.

STOLLER (B. B.), WEST (R. E.), & BAILEY (J. F.). **Controlling the mildew disease of the cultivated Mushroom.**—*M.G.A. Bull., 1956*, 82, pp. 316–322, 1956.

This information on the control of *Dactylium dendroides* [*Hypomyces rosellus*] in California has already been noticed [**36**, p. 163].

GATHERCOLE (J. A.). **Experiences in England with PCNB used against cobweb disease.**—*M.G.A. Bull., 1957*, 88, pp. 138–141, 2 fig., 1957.

As a result of further trials on a commercial scale with PCNB against mushroom cobweb disease (*Dactylium dendroides*) [*Hypomyces rosellus*: see above] the treatment recommended to eradicate existing infections is ½ lb. PCNB dust/1,000 sq. ft. every 7 days. On clean beds the same rate every 13 days, or half every 7 days, is sufficient for protection.

WOOD (F. C.). **Some notes on olive-green mould.**—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), **6**, 3, p. 214, 1957.

Although the occurrence of olive green mould (*Chaetomium globosum*) in mushroom compost is encouraged by high peak-heating temperatures and high humidity, the presence of calcium (10 p.p.m.) is essential for the formation of perithecia [**31**, p. 75].

Higher Ca concentrations (1,000 p.p.m.), however, inhibit both vegetative growth and fruit-body formation; it is recommended therefore that mushroom growers use gypsum during composting operations.

'Arpai (J.), Foltýn (O.), & Janotková (Ol'ga). **O antifungálnej aktivite izolátor Trichothecium s osobitným zretelom na ich antagonismus voči Plasmopara viticola.** [On the anti-fungal activity of isolates of *Trichothecium*, with special reference to their antagonism towards *Plasmopara viticola*.]—*Biológia, Bratislava*, **12**, 4, pp. 266–279, 4 fig., 5 graphs, 1957. [Russian and German summaries.]

At the Phytopathological Laboratory of the Slovak Academy of Sciences, Bratislava, Czechoslovakia, monospore isolates of a *Trichothecium* sp. [cf. **35**, p. 476] produced an antibiotic which effectively inhibited *P. viticola in vitro* and *in vivo*. Used as a spray at a concentration of 2·5 μg./ml., the substance protected up to 90% of vines against inoculation and prevented the further spread of already advanced infections in up to 80%.

Pine (T. S.). **Comparative studies of the fungus causing the dead-arm disease of Grapes.**—Abs. in *Phytopathology*, **47**, 9, p. 531, 1957.

Isolates of *Phomopsis* [*Cryptosporella*] *viticola* from Canada, S. Africa, New York, and California [**35**, pp. 73, 285] all proved to have identical cultural characteristics, some of which are noted. No grape variety has shown resistance. Penetration of the host is by stomata or wounds, but only after 4–8 hr. continuous moisture.

Ochs (G.). **Die Abhängigkeit der Sporenkeimung von Temperatur und Alter bei Pseudopeziza tracheiphila Müller-Thurgau.** [The dependence of spore germination in *Pseudopeziza tracheiphila* Müller-Thurgau on temperature and age.]—*Naturwissenschaften*, **44**, 20, pp. 545–546, 1 graph, 1957.

In preliminary tests at the Institut für Weinbau, Bernkastel-Kues, Germany, the optimum temperature for the germination (100%) of freshly discharged ascospores of *P. tracheiphila*, the agent of one of the most economically important vine diseases, was shown to lie between 18° and 20° C. [**8**, p. 701], compared with 3 and 27% at 7·5° and 30°, respectively. At 18° and 10° with a natural R.H. of 80% the germination percentages declined markedly with the age of the spores from the 1st to the 5th day.

From the practical standpoint these observations imply that a higher incidence of infection may be expected in warm than in cool weather. Under outdoor conditions the ejected spores lose their viability by the 4th day at latest unless there are showers.

Crall (J. M.) & Stover (L. H.). **The significance of Pierce's disease in the decline of Bunch Grapes in Florida.**—Abs. in *Phytopathology*, **47**, 9, p. 518, 1957.

Pierce's disease [lucerne dwarf virus: **26**, p. 480] was concluded from extensive tests on Carrignane vines to be a major factor in the decline of table grapes in Florida, the vectors *Oncometopia undata* and also *Hamalodisca triquetra* and *H. insolita*, separately or together, being more efficient than *Carneocephala flaviceps*.

Harris (R. V.). **Plant pathology.**—*Rep. E. Malling Res. Sta., 1956*, pp. 25–30, 1957. 17*s*. 6*d*.

Some of the information in this report [cf. **35**, p. 874] covering the period 1 Oct. 1955–30 Sept. 1956, has already been noticed. The superior control of *Pseudomonas mors-prunorum* on cherry leaves [**37**, p. 94] by Bordeaux mixture during the season under review was attributed to the earlier application of the sprays than previously. Two blossom sprays of streptomycin applied in the spring gave good

control of leaf spot. Glasshouse experiments with artificially inoculated cherry trees indicated that streptomycin was able to penetrate the leaves and prevent the internal development of bacteria. In Petri-dish tests streptomycin was bacteristatic to *P. mors-prunorum* at less than 1 p.p.m.; it is possible that strains of the pathogen differ in sensitivity to the antibiotic.

In joint work with the Biochemistry Section (A. E. Flood, p. 21) the toxicity of the chlorogenic acid in apple and pear to *Venturia inaequalis* and *V. pirina* [**37**, p. 90] was shown to be due to the caffeic acid component, the quinic part of the molecule being inactive.

A test of the resistance of 29 apple rootstock clones to 5 isolates of *Phytophthora cactorum* [**37**, p. 88] revealed variation in pathogenicity of the fungus and in rootstock resistance. The pathogen is widely distributed in the soils of orchards affected by collar rot and is not more highly concentrated round infected trees, but no evidence of mycelial growth in soil was obtained.

In the section on virus diseases an apple virus symptomless in Lord Lambourne and M. IX and causing green mottle in peach is reported not to be the rubbery wood virus. Infection of M. IV by apple chat fruit virus [**30**, p. 325] caused a change in growth habit. Apple star cracking virus [strain of apple mosaic virus] was more prevalent than had been supposed [**35**, p. 303]. The selection of virus-free pears, using new quince indicators [**36**, p. 330], has given good results. Cherry leaf roll virus was identified in 8 Kentish orchards and the incidence of cherry rasp leaf virus [**36**, p. 198] was high. A canker disease of the cherry variety Noble was shown to be graft-transmissible [cf. **37**, p. 95].

Aphid-transmitted strawberry viruses in England and California were found to be identical. The East Malling clone of *Fragaria vesca* was shown to carry a latent virus and a new clone is being selected. Two viruses (or virus strains) occurring in clover and other hosts were involved in the strawberry green petal disease [**35**, p. 689]. Apple mosaic virus and plum line pattern virus were transmitted by grafting to strawberry and caused symptoms resembling those of strawberry mosaic.

In a survey of loganberry plantations a graft-transmissible disorder, probably a virus disease, characterized by vein chlorosis and vein banding of the leaves, was observed.

A study of records of the spread and distribution of hop nettlehead virus [cf. **37**, p. 51] suggested that the disease was introduced into gardens by a vector which had acquired the virus from another host, and this is being investigated.

Sarejanni (A. J.), Démétriadès (S. D.), Zachos (D. G.), & Papaïoannou (A. J.). **Rapports sommaires sur les principales maladies des plantes cultivées observées en Grèce au cours des années 1953, 1954, 1955.** [Brief reports on the principal plant diseases observed in Greece during the years 1953, 1954, 1955.]—*Ann. Inst. phytopath. Benaki*, **8**, 2, pp. 77–83, 2 fig., 1954; **9**, 1–2, pp. 3–9, 1955; **10**, 1–2, pp. 3–8, 1956. [Received 1957.]

In the 1st report [cf. **34**, p. 706] the following items are mentioned *inter alia*. Vines were attacked severely by *Uncinula necator*. Peaches in Macedonia were affected by peach mosaic virus, and at Edessa showed symptoms of deficiency of both P and K. Rice cultivated for the first time on the plain of Marathon suffered severely from 'asphyxia', affecting the root system. *Phytophthora infestans* was noticed on potatoes in Thessalonica and on tomatoes elsewhere, and *Corynebacterium sepedonicum* [map 20] damaged potato crops considerably in Thebes, Attica, and on the island of Naxos. *Verticillium albo-atrum* was isolated from tomatoes from several localities. *Botrytis tulipae* [map 170] was noticed on Dutch [tulip] bulbs. *Ascochyta gossypii* [map 259] was recorded on cotton for the first time in Greece.

In the 2nd report *Pseudomonas savastanoi* on olive trees is noted from Crete and at Preveli. *P. syringae* caused serious damage to lemon trees on the Peloponnesian

coast. Cotton plants were infected by *Xanthomonas malvacearum* in the regions of Larissa and Serrai. *Bremia lactucae* [map 86] and *Marssonina panattoniana* [map 82] were observed on lettuce and *Plasmodiophora brassicae* [map 101] is recorded for the first time in Greece, on cabbage.

In the 3rd report a root rot attacking strawberries in severeal areas is noted; *Fusarium* sp. and *Rhizoctonia* sp. were isolated from the infected roots. *Sphaeropsis malorum* Peck [*Physalospora obtusa*] caused severe damage on Karlat apples in Macedonia. In Attica losses up to 70% were caused by *Phytophthora erythroseptica* [map 83] on potatoes. *Pseudopeziza medicaginis* [map 129] was found on lucerne.

Sarejanni (J. A.), Démétriadès (S. D.), & Papaïoannou (A. J.). **Catalogue commenté No. 3 des champignons, bactéries et virus rencontrés sur les plantes cultivées en Grèce.** [Annotated list No. 3 of fungi, bacteria, and viruses found on cultivated plants in Greece.]—*Ann. Inst. phytopath., Benaki*, **8**, 2, pp. 84–87, 1954. [Received 1957.]

The majority of the species in this list [cf. **31**, p. 256], which also includes hosts and localities, have been noted in the annual reports of diseases in Greece [see above].

Papaïoannou (A. J.). **Notes phytopathologiques. I. II.**—*Ann. Inst. phytopath., Benaki*, **8**, 2, pp. 96–102, 4 fig., 1954; **10**, 1–2, pp. 22–27, 1 fig., 1 graph, 1956. [Received 1957.]

These notes record diseases new to Greece. In the 1st paper *Macrophomina phaseoli* is reported on lucerne [cf. **23**, p. 187], the clayey soil in which the disease appeared being considered to have an important influence on the severity of the attack. Near Athens *M. phaseoli* was recorded attacking asters but the pycnidial form of the fungus was not found; nearly complete loss of the plants resulted. The roots, as with cotton, were damaged most, infection occurring on them and on the collar.

Pseudopeziza medicaginis, already known in Greece on lucerne and *Lotus corniculatus*, was recorded on *Medicago arborea*, which will form a winter host for the fungus and a source of infection for lucerne.

Phytophthora cactorum was recorded on *Aquilegia* sp.

In the 2nd paper leaf spot disease, causing notable damage to *Pittosporium sinense* at Athens, is attributed to *Septoria pittospori* [cf. **14**, p. 816], despite a spore length of 17–20 μ compared with 20–25 μ in Saccardo's description of the species. Inoculation was successful only on wounded tissue.

Verticillium albo-atrum was recorded on pistachio nut [cf. **29**, p. 448] associated with a wilt (a hadromycosis [**7**, p. 179]). It is, however, believed to occur secondarily to an attack by *Fusarium* sp. [**12**, p. 469].

Report of the Department of Agriculture, N.S.W., for the year ended 30th June, 1956. —111 pp., 13 fig., 1957. 9*s*.

Much of the information in the plant pathology section of this report (pp. 61–66) [cf. **36**, pp. 455, 575] has already been noticed. The host range of *Phytophthora cinnamomi* in the State was extended by 17 new records, mostly on native and ornamental plants, and a number of other records of root and crown rots caused by *Phytophthora* spp. were made.

Septoria nodorum occurred on wheat late in the season, Warigo being particularly susceptible. Two other diseases causing losses were take-all (*Ophiobolus graminis*) in the Wagga area and bunt (*Tilletia tritici* [*T. caries*]). *Puccinia sorghi* was prevalent on maize crops.

Leaf spot (*Pseudopeziza medicaginis*) and rust (*Uromyces striatus*) on lucerne caused severe defoliation and [lucerne] witches' broom [virus] was also prevalent in the autumn.

Bacterial wilt (*Pseudomonas solanacearum*) of tobacco was severe in seedbeds at Bourne and blue mould (*Peronospora tabacina*) [**35**, p. 162] caused some damage.

Tomato yellow top virus [**36**, p. 456] has now been recorded in inland districts. Drop head wilt of tomatoes [**35**, p. 355], not yet recorded in outdoor crops, was shown to be due to a strain of tobacco mosaic virus.

Citrus seedlings withstood continuous heat therapy at 36° C. for 10 weeks, but the treatment failed to eliminate stem pitting and tristeza viruses [cf. **37**, p. 40]. Morton citrange as a stock appeared to be susceptible to tristeza decline. Reichert's claim that xyloporosis and stem pitting are caused by the same virus [cf. **36**, p. 317] has been supported by experiments under glasshouse conditions with sweet lime indicator seedlings. Lemon crinkle virus [**35**, p. 878] has been found on lemon trees at Somersby; experiments with severe and mild strains showed no evidence of relationship with citrus psorosis virus. No seedling indicator has yet been found for decline of sweet orange on rough lemon, now considered unrelated to xyloporosis. Overgrowth of the scion appears the only reliable symptom, apart from stunting and decline. Heavy rain in early spring tested the adhesiveness of sprays against mandarin brown spot [cause unspecified: **35**, p. 422]. Copper oxychloride+zineb was excellent, but zinc Bordeaux+zineb no better than zinc Bordeaux alone. Manganese deficiency symptoms developed on citrus near Sydney; spraying with 1 lb. manganese sulphate/100 gal. improved the appearance of the trees but did not give complete control, which was only achieved with 4 and 5 lb./100 gal.

In the control of black spot (*Venturia inaequalis*) on apple the concentration of the green-tip and spur-burst Bordeaux mixture sprays may be reduced to 5–5–100, but spraying is required at both these stages for maximum control. Following the spraying of 2 heavily infected orchards with 0·1% PMC [phenyl mercuric chloride: **36**, p. 192] in the autumn of 1955, only 1% of fruit was affected by black spot at harvest. In another such orchard sprayed with 0·1% phenyl mercuric acetate in autumn 1955 followed by a lime sulphur spray in Dec. control was complete. Thiram again proved the best fungicide against *Venturia pirina* [**36**, p. 192] on pears.

Flat limb of Gravenstein apples on their own roots, believed to be a virus, is widespread. A measles condition on early McIntosh is under investigation. The virus disease thumb mark was identified on a Granny Smith at Batlow.

Climax strawberry withstood the heat therapy against virus diseases well.

Flowering peach, geranium [*Pelargonium*], and asters were infected by tomato big bud virus. *Aschochyta chrysanthemi* was not as serious on chrysanthemum as in the previous years. Improved ceresan and phenyl mercuric nitrate appear to give the best control of the gladiolus corm diseases [**34**, p. 787], bacterial scab [*Pseudomonas marginata*], *Sclerotinia* [*gladioli*], and *Botrytis* rot [not specified]. Broad bean wilt virus was isolated from a number of new ornamental hosts [**35**, p. 661], mainly in the metropolitan area, with a very high incidence of infection in some instances (e.g. blue lupins, 100%).

Bates (G. R.). **Botany and Plant Pathology.**—*Rep. Minist. Agric. Rhod. Nyasald 1955–6*, pp. 79–86, 1957. 10*s*. 6*d*.

In this report [cf. **36**, p. 380] for the year ended 30 Sept. new host and disease records include *Xanthomonas vesicatoria* [map 269], *Colletotrichum atramentarium*, and *Verticillium dahliae* on tomato; *Botrytis cinerea* on tobacco, broad bean, and groundnut; *Cladosporium cucumerinum* [map 310] on cucumber; *Cercospora cajani* on pigeon pea; and *Pseudomonas solanacearum* [map 138] on bougainvillea and *Symphytum peregrinum*.

Barn rot (*Rhizopus arrhizus*) of tobacco caused more trouble than usual, especially among early curings. Tobacco rosette virus was again recorded on tobacco and for the first time affected *Nicotiana rustica*. After a lapse of several years *Septomyxa affinis* was again found on tobacco seedlings.

The summer potato crop was seriously damaged by blight (*Phytophthora infes-*

tans) and a breakdown of the resistance of two varieties was observed: Pentland Ace succumbed to race 3,4 more readily than the susceptible Up-to-Date variety, while early irrigation crops of Kennebec were attacked by race 1,3,4. Resistant varieties derived from *Solanum demissum* cannot, therefore, be relied upon. Several varieties of Dutch origin have yielded well in the past 2 years under severe blight attacks. *Erwinia atroseptica* has not yet been discovered in potatoes grown from locally produced seed, and this, together with the failure to recover the bacterium from the soil, reinforces the opinion that the disease does not persist for long in local soils. *Pseudomonas solanacearum* occurred in Eastern districts and caused losses amongst irrigation crops.

On maize leaf blight (*Helminthosporium turcicum*) [**37**, p. 37] was less severe than in the past three seasons and incidence of *Puccinia polysora* was low. *Diplodia zeae* [*D. maydis*] was very prevalent on the cobs. *E. carotovora* [**36**, p. 523] caused stalk rot of hybrid maize for the first time at Umvumvumu in the Sabi valley. At the Henderson Research Station plants of one inbred line showed rotting of the growing point; none of bacteria isolated proved pathogenic on inoculation. *Sclerospora sorghi* was less severe than in the previous season.

Pseudomonas syringae attacked velvet bean [*Mucuna deeringiana*] for the second successive year.

The disease of cowpea due to *Ascochyta* sp. near *phaseolorum* [**35**, p. 92] has proved to be seed-borne, the deep-seated infection being unaffected by fungicidal dressings.

Uromyces striatus was recorded on lucerne from the Midlands district, *Pseudoplea trifolii* from Salisbury, and *Pseudopeziza medicaginis* from Melsetter and Karoi.

The outbreak of red clover leaf spot due to *Stemphylium sarciniforme* [map 139], not previously encountered in Southern Rhodesia, was severe.

Phytophthora infestans on tomatoes at Melsetter, Umtali, and Salisbury is becoming a serious menace; at least two races adapted to tomato have been identified [**36**, p. 661]. *Verticillium dahliae* was responsible for wilt of tomatoes under glass and was associated with wilt symptoms in eggplant and okra. From the Sabi Valley an outbreak of buck-eye rot (*P. parasitica*) has been reported.

There were outbreaks of rust (*Uromyces fabae*) on broad beans.

P. parasitica was severe on antirrhinums; dahlia tubers imported from the Netherlands and found to be infected by tomato spotted wilt were destroyed.

After infection of sunn hemp [*Crotalaria juncea*] by *Colletotrichum curvatum* it is recommended that the crop should not be planted again on infested land before a lapse of three rainy seasons. In inoculation experiments 12 species of *Crotalaria* were immune from all 7 isolates used.

Cross-inoculations indicated that despite the close morphological resemblance to *Elsinoe phaseoli*, a fungus attacking French beans [*Phaseolus vulgaris*] is probably undescribed. Good control of the disease was obtained by spraying before flowering with 4:6:50 Bordeaux and from early pod set with thiram or captan at 2 lb./100 gal. water.

Annual Report, Department of Agriculture, Kenya, 1955. Vol. II.—237 pp., 1957. 7/50*s*.

In the report of the senior research officer, plant pathology (pp. 15–20) [cf. **35**, p. 589], R. M. Nattrass records a serious dwarfing and distortion of indigenous *Trifolium* species, including *T. semipilosum*, *T. rueppellianum*, and *T. massaiensis* in the Kitale District, with malformation of the flower heads. The condition may be of virus origin. *Uromyces elegans* was found on *T. semipilosum*. Lucerne was attacked by *U. striatus* [cf. **34**, p. 549] and lupins by *U. renovatus* [cf. **33**, p. 484]. A disease of *Panicum maximum*, in which the central shoots are much swollen, appeared to be due to an unidentified phycomycete.

A severe heart rot of fodder beet was induced by *Rhizoctonia* [*Corticium*] *solani*. Perennial rye grass [*Lolium perenne*] was severely attacked by *Puccinia coronata*. A severe outbreak of *Peronospora parasitica*, associated with *Cystopus candidus* [*Albugo candida*], occurred on kale grown for seed.

Septoria lycopersici was frequently recorded on tomatoes and often mistaken for blight (*Phytophthora infestans*), which caused much damage in many localities. Bacterial wilt (*Pseudomonas solanacearum*) and leaf spot (*Alternaria solani*) of tomatoes were also encountered. Diseases of French beans [*Phaseolus vulgaris*] included *Pseudomonas medicaginis* f. [sp.] *phaseolicola* (the most prevalent), *Ascochyta phaseolorum*, and *Uromyces phaseolorum* [*U. appendiculatus*]. *Dolichos lablab* and cowpea were again attacked by *Elsinoe phaseoli*, also present on *Phaseolus aureus*.

Severe infection by rust (*Puccinia asparagi*) occurred on Martha Washington asparagus, claimed to be immune or highly resistant [cf. **32**, p. 58]. In one or two areas cabbages were attacked by *Xanthomonas campestris* [cf. **35**, p. 587]. Chillies in the Coast and Central Provinces suffered severely from *Leveillula taurica* [cf. **35**, p. 816], *Cercospora unamunoi* [cf. **34**, pp. 18, 400], and *Colletotrichum capsici*, singly or in combination, the first two sometimes producing complete defoliation and the last-named black lesions on the pods or a total blackening which frequently developed only during drying.

The presence of stem-pitting virus disease of citrus [cf. **36**, p. 99, *et passim*] was confirmed in the Coast Province. Panama disease of bananas (*Fusarium oxysporum* var. [f.] *cubense*) [cf. **35**, p. 93] was recorded a few times, but does not appear to be increasing. Rust (*Puccinia* [*Tranzschelia*] *pruni-spinosae*) [cf. **35**, p. 588] and root rot (*Armillaria mellea*) were found on peach, and mildew (*Podosphaera leucotricha*), scab (*Venturia inaequalis*), and mosaic virus disease on apple. At Molo Horticultural Experimental Station the strawberry crinkle virus complex [**35**, p. 589] was found in established and recently imported stocks. Incidence of bud disease (*Ramularia bellunensis*) [cf. **35**, p. 358] of pyrethrum [*Chrysanthemum cinerariifolium*] now seems to have reached a state of equilibrium.

Antirrhinum rust [*Puccinia antirrhini*] caused considerable losses to commercial growers; stem rot (*Phyllosticta antirrhini*) [cf. **31**, p. 538] was also present. Carnation rust (*Uromyces dianthi*) was serious and dahlia leaf spot (*Entyloma dahliae*) widespread. A leaf spot of pansies was caused by a species of *Ramularia*. A soft rot of *Zantedeschia* rhizomes was caused by bacteria, probably *Bacterium carotovorum* [*Erwinia carotovora*]. A gladiolus disease affecting the basal 2 or 3 in. of the shoot, but leaving the corm undamaged, was caused in a commercial nursery by a species of *Botrytis*; an extensive corm rot in another locality gave *Fusarium oxysporum* in culture. The biotypes of potato blight so far determined in Kenya are A, C, D, G, H, and I.

In the report of the senior plant breeder (pp. 45–60) H. C. Thorpe states that weather conditions induced a severe and widespread outbreak of wheat stem rust (*Puccinia graminis*) [cf. **35**, pp. 7, 664, *et passim*]; varieties badly damaged included 341 and 184, while Canadian Regent, 354, and 321 were resistant. The prevalent races present were K 14, and 2 new ones, K 15 and K 16. Other diseases also markedly increased: glume blotch (*Septoria nodorum*) [cf. **35**, p. 358] was widespread, attacking particularly 318 and Regent wheat. Both *Ophiobolus graminis* and *Pyrenophora* root rot [*P. tritici-repentis*: cf. **35**, p. 277] caused great damage at the higher altitudes. *Puccinia triticina* and *P. glumarum* were, however, less conspicuous than before.

In the report for 1954–5 by the plant pathologist and physiologist, Coffee Services (pp. 81–100), R. W. Rayner describes inoculation experiments to determine the incubation period of *Hemileia vastatrix* and to ascertain whether it varied with the time of year. The time taken for 5% of the spots to sporulate ranged from

3 to 6·5 weeks and averaged 4·6; the longest times were in June and July. The time to the 50% point, when strong spore production starts, ranged from 4 to 7·4 weeks (average 6·3) and was again longest in June and July, when cold weather prevails. The incubation period is notably longer in Kenya than in other countries, probably because of the prevailing low temperatures. In 1953–4–5 maximum spotting occurred about Aug. Of 3 collections of the fungus from different parts of Kenya, each consisted of a separate physiologic race. One attacked selection K. 7, which often develops yellow circular areas on the leaves, up to 1 cm. diam., that may represent a resistant reaction.

In 1954 rainfall was higher than at any time since 1951, and coffee berry disease [*Glomerella cingulata*: **36**, p. 402] caused heavier infection in estates in the N.E. region of Upper Kiambu than before. Heavy infection occurred in one case at an altitude of only 5,200 ft. Preliminary results of a trial conducted on two estates during the short rains (Nov.–Dec.) indicated that verdasan gave good control of the brown blight stage [**29**, p. 259].

Isolations from the proximal region of lesions of Elgon die-back [cf. **35**, p. 276] at an early stage of development gave mainly a *Glomerella*, probably *G. cingulata*. The evidence indicated that the first symptom is invariably a lesion which kills one or two internodes in the green bark portion of a branch, usually some way back from the apex; the distal part then wilts and dies. The disease cannot be due to starch deficiency, and the possibility that it may be of fungal origin should be re-examined.

Cases of intermittent chlorosis were common in cold weather during 1954–5. Possibly, short exposure to cold at night, when growth is occurring, may disturb chloroplast division in the leaf primordia, with resultant absence of chloroplasts from some of the daughter cells. Seedling disease (*Rhizoctonia* [*Corticium*] *solani*) appeared for the first time in many years in a nursery at Donyo Sabuk. A tip-burning and scorching of young leaves was widespread in Upper Kiambu in June 1954; a fungus, apparently a *Cytospora*, was almost invariably isolated in culture and was also present on the dead tissue.

Clifton (C. E.), Raffel (S.), & Stanier (R. Y.). **Annual review of microbiology. 11.**—536 pp., 4 fig., Palo Alto, California, Annual Reviews, Inc., 1957. $7 (U.S.A.), $7.50 (elsewhere).

In a section on the prediction of plant disease epidemics [**35**, p. 383] P. R. Miller & Muriel J. O'Brien (pp. 77–110) review at some length the status of work on potato and tomato blight (*Phytophthora infestans*), with shorter notes on scab of apple and pear (*Venturia inaequalis* and *V. pirina*), downy mildew of the vine (*Plasmopara viticola*), and other diseases, and conclude with a summary of research contributing to forecasting work [224 refs.].

K. M. Smith (pp. 111–122) reviews some problems in plant virus studies [26 refs.].

H. G. Thornton & Jane Meiklejohn (pp. 123–148) cover the progress in soil microbiology during 1952–56 [248 refs.].

Advances in the identification of plant viruses by serological methods are discussed by E. van Slogteren & D. H. M. van Slogteren (pp. 149–164) [110 refs.].

E. A. Steinhaus (pp. 165–182) reviews progress in the study of microbial diseases of insects, with mention of a number of entomogenous fungi [171 refs.].

Bibliography of soil science, fertilizers and general agronomy 1953–1956.—Farnham Royal, Bucks., Commonwealth Agricultural Bureaux, 661 pp., 1957. 70*s*.

In the 8th volume of this series prepared by the Commonwealth Bureau of Soils, Harpenden, 12,000 papers on soil science and related topics are listed according to the Universal Decimal Classification system. Papers on plant diseases are on pp.

313–335, followed by a detailed subject index, an author index, list of periodicals covered, and a key to the U.D.C. numbers used.

HAGBORG (W. A. F.). **Maintenance of contaminant-free stain preparations for the detection of bacteria in plant tissues.**—*Phytopathology*, **47**, 10, p. 628, 1957.

At the Canada Dept of Agric., Winnipeg, in order to avoid bacterial contamination of 2% congo red stain, 0·1% mercuric chloride was substituted for distilled water. Stain coagulation with acid host tissues was countered by alkalization of the smear with sodium bicarbonate before staining.

The staining procedure is to chop up a small piece of the lesion in a drop of the stain on a clean slide; the coarser particles are scraped off and the residue allowed to dry without application of heat. A few drops of acid alcohol are run over the slide and allowed to evaporate before examination.

STAPP (C.) & HARTWICH (W.). **Zur Frage der Resistenzverschiedenheiten pflanzlicher Wirte gegenüber pathogenen Bakterien und ihren Ursachen. III. Faktoren von Virulenzeinfluß auf Erwinia phytophthora.** [On the question of the differences in resistance of plant hosts to pathogenic bacteria and their causes. III. Factors influencing the virulence of *Erwinia phytophthora*.]—*Zbl. Bakt.*, Abt. 2, **110**, pp. 449–470, 8 graphs, 1957. [Numerous refs.]

In further studies on the resistance of solanaceous hosts to *E. phytophthora* [**36**, p. 121] it was found that resistance increased with increasing pectin content of the plant, was inversely proportional to Ca content, and decreased as the Ca/pectin ratio increased. When shoots were grown in culture solutions of different Ca content the highest resistance occurred in plants receiving the highest conc. of Ca. Susceptibility was greater in hosts with higher water content. Susceptible hosts became more resistant when grafted to the resistant *Cyphomandra betacea* but were unaffected when the latter was grafted to them: the mechanism is not yet understood. Tomato and *C. betacea* reacted similarly in respect of susceptibility to a pectinase preparation as they did to *E. phytophthora*. The effect of the pectinase solution was increased by the addition of ions of alkalis and of alkaline earths (K > Na > Mg > Ca). Ca had two opposite effects: increasing resistance when bound to host pectin, but reducing it when available to activate the pectolytic enzymes of the parasite. Stem nodes offered both a mechanical and a physiological barrier to the infection; under certain experimental conditions it was found that, in general, resistance increased with the number of nodes/unit length of stem irrespective of species. None of the factors studied could be singled out as the decisive one. The production by resistant plants, after infection, of a bacteriostatic defensive substance could not be demonstrated but seemed likely. The possibility is discussed that a role might be played in the disease process by a pectolytic enzyme produced by the host but activated by the parasite.

OKABE (N.) & GOTO (M.). **Studies on the strains of Erwinia carotovora (Jones) Holland. I. Antigenic structures of flagella and their relations to pathogenicity and maltose fermentation.**—*Bull. Fac. Agric. Shizuoka Univ.* 6, pp. 16–32, 1956. [Japanese. Abs. from English summary. Received 1957.]

The results of serological tests of the H-antigens (flagella antigens) of 180 isolates of *E. carotovora* are tabulated in an attempt to find a rapid method for identifying the different strains. Twelve serological groups, A to L, were differentiated by means of agglutination tests on slides. The lactose-fermenting group of *E. carotovora*, when grown in peptone water, all possessed *l* antigens with two exceptions. A relationship was indicated between the possession of *l* antigens and the ability to ferment maltose. Some strains of groups A and L had a wide host range, including carrot, potato, and tobacco, but not Chinese cabbage, while those of B and C were highly infectious to Chinese cabbage but less so to carrot.

Cunningham (G. H.) & Atkinson (J. D.). **Certification of therapeutants and plant hormones.**—*Inform. Ser. Dep. sci. industr. Res. N.Z.* 13, 23 pp., 1956. [Received 1957.]

This list supersedes previous ones [**35**, p. 622], as from July 1956, and contains, in addition, information on certified plant hormone preparations.

Kirby (A. H. M.). **Plant protective chemistry.**—*Rep. E. Malling Res. Sta., 1956*, pp. 35–37, 1957.

In further studies on the toxicity of oxidation products of nabam [**35**, p. 907 and below] to spores of *Venturia inaequalis* and *Botrytis cinerea*, none was superior to captan. The phthalimide analogue of captan was equal to pure captan in slide tests against *V. inaequalis* and *B. cinerea*; the succinimide one was slightly inferior.

Watering greenhouse apple plants with ammonium nitrate increased their susceptibility to powdery mildew (*Podosphaera leucotricha*) for fungicide trials. The fourth unrolled leaf and younger ones were the most susceptible to infection. Cinnamic acid [**35**, p. 898] gave no promise of control.

Kirby (A. H. M.) & Frick (E. L.). **Glass-slide spore-germination tests with some oxidation products of nabam.**—*Rep. E. Malling Res. Sta., 1956*, pp. 146–151, 1957.

The toxicity to *Venturia inaequalis* and *Botrytis cinerea* of products obtained by the aeration or oxidation of dilute aqueous solutions of nabam [see above] was evaluated. Materials which were probably ethylene thiuram monosulphide [**36**, p. 453] and polymers were as active as captan against *V. inaequalis* but less active against *B. cinerea*. Ethylene thiuram disulphide was less active against both organisms than the monosulphide. When a dilute nabam solution was partially evaporated in a shallow tray the resulting compound was as toxic as ethylene thiuram monosulphide to *V. inaequalis* but its N:S ratio was different from the monomer or polymer.

Le Tourneau (D.), McLean (J. G.), & Guthrie (J. W.). **Effects of some phenols and quinones on growth in vitro of Verticillium albo-atrum.**—*Phytopathology*, **47**, 10, pp. 602–606, 1 diag., 6 graphs, 1957.

At Idaho Agricultural Experiment Station, Moscow, 13 phenols and phenolic acids and 4 quinones were tested against the growth of *V. albo-atrum* [cf. **36**, p. 347] in a sucrose-salts liquid medium. Catechol (with *o*-hydroxyl groups) was the most inhibitory of 3 dihydroxybenzenes, its effectiveness being reduced by substituting a carboxyl for a hydroxyl group or introducing a carboxyl group on the ring. Pyrogallol was the most toxic phenolic compound tested. The quinones were generally more toxic than the phenols, particularly if chlorinated, and 1,4-naphthoquinone was more toxic than 1,4-benzoquinone. Considerable inhibition was caused by dichlone at 10^{-6} M (below 1 p.p.m.).

Tamura (N.). **Evaluation of fungicidal activity of organic fungicides. IV. The decrease of the fungitoxicity in weathering-process of several organic fungicides.**—*Ann. phytopath. Soc. Japan*, **21**, 4, pp. 159–161, 5 graphs, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further studies in this series [**35**, p. 835] 5 organic fungicides were exposed in solvents in open Petri dishes in a greenhouse for 1–7 days at 24–25° C. The ED 95 values for each fungicide were determined with *Piricularia oryzae*. All the fungicides decreased in toxicity under dry or moist conditions, more rapidly under the latter. Phygon, spergon, and arasan were most resistant to weathering.

Terui (M.) & Kagawa (H.). **Vapour action of belvitan K to the mycelial development of some plant parasitic fungi.**—*Bull. Fac. Agric. Hirosaki Univ.* 2, pp. 1–4, 1 fig., 1956. [Received 1957.]

Corticium vagum and *Cochliobolus miyabeanus* were grown for 14 days on potato agar plates with 0·05, 0·1, and 0·5 g. belvitan K [**34**, p. 481] scattered on the inside of the lid, and then for a further 14 days without the chemical. No growth of *C. vagum* occurred at 0·5 g. but *C. miyabeanus* resumed slight growth on the 19th day.

Csongrády (M.) & Ubrizsy (G.). **Fitoncidok alkalmazása növényi kórokozók ellen. I. Rész.** [Application of phytoncides against plant pathogens. Part 1.]—*Ann. Inst. Prot. Plant. Hung.*, 7 (*1952–56*), pp. 367–379, 3 fig., 1 graph, 1957. [Russian and English summaries.]

At the Institute for Plant Protection, Hungary, treatment of cucumber seeds with the volatile phytoncide of onion [**35**, p. 335] reduced seedling infection by *Rhizoctonia* [*Corticium*] *solani* from 88% (untreated) to 12%.

Root pulp of horse-radish completely inhibited the growth of *Aspergillus niger* in culture at a distance of 20 cm. and had some effect at 50 cm. Onion reduced germination of wheat by 50%, whereas garlic stimulated it by 4–5%. Flax seeds affected by garlic proved to be 100% sterile, though germination was not influenced by other phytoncidal sources.

Against *A. niger* garlic sap diluted 1:26 and onion 1:18 with distilled water lost their phytoncide capacity.

Catalogue of the culture collection of the Commonwealth Mycological Institute. Ed. 2—75 pp., Kew, Commonwealth Mycological Institute, 1957. 7*s*. 6*d*.

This is an enlarged edition of the list of fungus cultures of interest in plant pathology, industry, taxonomic research, and education, maintained at the Commonwealth Mycological Institute, Kew, Surrey.

Baldacci (E.). **Antibiotic activity and other biochemical characteristics in the classification of species in Actinomyces.**—*G. Microbiol.*, **2**, pp. 50–62, 1956. [Received 1957.]

In this paper, read [in Italian] at the First European Symposium on the Biochemistry of Antibiotics [? Milan, 1956], the author discusses his method of classifying on the basis of antibiotic production [cf. **37**, p. 149] the actinomycetes within the different 'series' [cf. **35**, p. 793] (colonies presenting common morphological characters when grown on suitable media).

Brian (P. W.), Curtis (P. J.), Hemming (H. G.), & Norris (G. L. F.). **Wortmannin, an antibiotic produced by Penicillium wortmanni.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 365–368, 1 pl., 1957.

At the Akers Research Laboratories of Imperial Chemical Industries Ltd., Welwyn, Herts., an antifungal compound named wortmannin, isolated from a culture of *P. wortmanni*, inhibited spore germination of *Botrytis allii*, *B. cinerea*, *B. fabae*, *Cladosporium herbarum*, and *Rhizopus stolonifer* at conc. of 0·4–3·2 μg./ml.; 21 of the 38 test species were unaffected by 100 μg./ml. Wortmannin causes a spiral curling of *B. allii* germ-tubes distinct from that caused by griseofulvin.

Brian (P. W.), Curtis (P. J.), Hemming (H. G.), & Norris (G. L. F.). **Pulvilloric acid, an antibiotic obtained from cultures of Penicillium pulvillorum.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 369–374, 1957.

The isolation of a non-specific antibiotic, pulvilloric acid, from cultures of *P. pulvillorum* at the Akers Research Laboratories of Imperial Chemical Industries Ltd., Welwyn, Herts., is described. The best medium for the production of the

antibiotic was Raulin-Thom with 5–10% glycerol as the carbon source. At conc. of 3·125–25 μg./ml. spore germination of all 13 test fungi was reduced to 5% or less. The antibiotic activity of pulvilloric acid was strongest at low pH values.

NAITO (N.) & TANI (T.). **Antibiotic production by Gloeosporium olivarum cultured on media supplied with 2,4,5-T or M.C.P.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 74–78, 6 graphs, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further studies [at the Kagawa Agricultural College, Japan: **35**, p. 703] an antibiotic was isolated from culture filtrates of *G. olivarum* grown in media containing 2,4,5-T or MCPA.

FUKUNAGA (K.), MISATO (T.), ISHII (I.), & ASAKAWA (M.). **Application of antibiotics to agricultural chemicals. III. Comparison with three testing methods in the laboratory.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 79–84, 7 graphs, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further studies in this series [cf. **35**, p. 924] the concentration of antimycin A, aureothricin, eurocidin, and trichomycin [see below] for antifungal activity appeared to be highest when assayed by the paper disk diffusion method, lowest by the agar streak dilution method, and intermediate by the spore germination test.

MIZUNO (T.), OHASHI (O.), SAKAI (A.), & FUJIBE (S.). **Effects of trichomycin on phytopathogenes.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 85–88, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

At the Sanyo Chemical Company, Japan, 25 of 41 [unspecified] plant pathogens were inhibited *in vitro* by 0·01–0·16 μg./ml. trichomycin [see above]. Seed germination was promoted by it.

SCOTT (W. J.). **Water relations of food spoilage microorganisms.**—*Advanc. Food Res.*, **7**, pp. 84–127, 6 graphs, 1956. [94 refs. Received 1957.]

This review, from the C.S.I.R.O. Division of Food Preservation and Transport, Homebush, New South Wales, is concerned with the quantitative aspects of the water requirements of micro-organisms causing food spoilage, the view being propounded that these requirements are best considered in terms of the activity of the water in the immediate environment of the organisms. The concept of 'water activity' is outlined in a preliminary discussion, and there are sections on the water requirements for growth of moulds, yeasts, and bacteria; the factors affecting water requirements; halophilic bacteria, osmophilic yeasts, and xerophilic moulds; and applications of the foregoing in food preservation.

BOIDIN (J.) & PRÉVOT (J.). **Penicillium, Paecilomyces et Trichoderma recontrés en tannerie.** [*Penicillium*, *Paecilomyces*, and *Trichoderma* encountered in the tannery.]—*Bull. Ass. franç. Chim. Cuir.*, **19**, 10–11, pp. 211–228, 1 fig., 3 graphs, 1957.

Following a brief review of *Penicillium* spp. reported in the literature in connexion with tanning, the authors present a table of the 6 monoverticillate, 11 asymmetric, and 3 biverticillate symmetric species at present recognized in the industry, indicating the frequency with which they, and also *Paecilomyces varioti* [*Byssochlamys fulva*] and *Trichoderma viride*, are encountered in tanning liquors and materials, and on leather, hides, and work-bench coverings.

They also report a biochemical study of the 2 last-mentioned and of 8 *Penicillium* spp. [cf. **36**, p. 488] isolated at the Institut de Recherches pour les Industries du Cuir, Lyons, concluding that *P. frequentans*, *P. baiiolum*, *P. spinulosum*, *P. purpurescens*, *P. corylophilum*, and *T. viride* utilize tannins; the last 3 utilize fats; and *P. frequentans*, *P. baiiolum*, *P. corylophylum*, and *T. viride* utilize gelatin.

RECKENDORFER (P.). **Über das Fluor-Eisen-Gleichgewicht in der pflanzlichen Zelle.** [On the fluorine-iron balance in the plant cell.]—*PflSchBer.* **19**, 10–11, pp. 135–144, 1957. [English summary.]

Following comparison at the Chemisches Laboratorium, Bundesanstalt für Pflanzenschutz, Vienna, by a method which is described, of the levels of fluorine [**32**, p. 496; cf. **36**, p. 416] and iron in the yellow lesions and unaffected green parts of cherry leaves damaged by fluorine, and a study of symptoms in *Primula* plants exposed to sodium fluoride *via* the soil, the author concludes that the yellow colour of the lesions is that of carotin and xanthophyll. The loss of greenness results from the inactivation by fluorine of the iron-containing substances which catalyse the production of chlorophyll. Affected patches can recover their greenness if sufficient iron becomes available.

DAVIES (R. R.). **A study of air-borne Cladosporium.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 409–414, 1 graph., 1957.

The viability of *Cladosporium* spores trapped in a laboratory and on the roof at St. Thomas's Hospital Medical School, London [cf. **36**, p. 605], in autumn by means of a slit sampler was very high, the number of non-viable dispersion units being insignificant. In a comparison of the relative efficiencies of a cascade impactor and a slit sampler little difference was found.

BOULLARD (B.). **Progrès récents dans l'étude des mycorhizes endotrophes.** [Recent progress in the study of endotrophic mycorrhiza.]—*Bull. Soc. bot. Fr.*, **103**, 1–2, pp. 75–90, 1956. [101 refs.]

This review includes sections on 'mycotrophism' and plant associations, on mycorrhizal associations in the major plant groups, and the study of the physiology of endotrophic mycorrhiza.

HAWKER (LILIAN E.), HARRISON (R. W.), NICHOLLS (VALERIE O.), & HAM (ANGELA M.). **Studies on vesicular-arbuscular endophytes. I. A strain of Pythium ultimum Trow in roots of Allium ursinum L. and other plants.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 375–390, 1 pl., 4 fig., 1957. [24 refs.]

An account of studies at the Dept of Botany, University of Bristol, of a phycomycetous endophyte forming vesicular-arbuscular mycorrhiza in the roots of *A. ursinum*, isolated, and identified as *Pythium ultimum*. Among the many wild and cultivated plants in which an essentially similar endophyte was found were asparagus, lily-of-the-valley, and *Scilla sibirica*.

HIRATA (S.). **Studies on the phytohormone in the malformed portion of the diseased plants. 2. On the reformation and the situation of free-auxin in the tissues of fungous galls.**—*Ann. phytopath. Soc. Japan*, **21**, 4, pp. 185–190, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further studies at the Faculty of Agriculture, Miyazaki University, on galls caused by *Albugo candida* on rape, *Exobasidium camelliae* var. *gracilis* on *Camellia sasanqua*, *E. symploci-japonicae* on *Bobua japonica*, *Tuburcinia* [*Urocystis*] *japonica* on *Anemone sieboldi*, and *Ustilago onumae* on *Cinnamomum japonicum* [**35**, p. 705], the maximum concentration of free auxin, as determined by Went's oat coleoptile test, occurred in young galls before the formation of the hymenium. Concentration decreased with maturation, and was higher in the lower than upper parts. In rape galls from which the auxin was removed by washing in water, fresh auxin reappeared after 24 hr. at 23° C. Such a result was not obtained in a similar test with the two *E.* galls. The parts of gall tissue containing most auxin were more electro-positive than those containing less.

IMAI (MORIEKO). **Studies on cerophilic growth of mould on wax and paraffin.**—*Bot. Mag., Tokyo*, **69**, 819, pp. 359–368, 4 graphs, 1956. [Received 1957.]

At the Ochanomizu University, Tokyo, 22 moulds isolated from bamboo culms as well as a number of stock cultures were tested for their ability to grow with wax or paraffin or allied substances as the sole source of carbon. The growth of an unidentified mould of the fungi imperfecti, W 1, and of *Aspergillus flavus*, which was increased by the addition of tween 40 or tween 80, was studied in detail. Other *A.* spp. and species of *Alternaria* and *Penicillium* were also cerophilic.

TANI (T.) & NAITO (N.). **On the nitrogen content of plants infected with several rust fungi.**—*Tech. Bull. Kagawa agric. Coll.*, 7, 2, pp. 141–143, 1956. [Japanese. Abs. from English summary. Received 1957.]

Following reports that the nitrogen content of wheat plants infected by rusts [*Puccinia* spp.] is higher than in healthy [cf. **36**, p. 179], other diseases were investigated. Leaves of pear infected by *Gymnosporangium haraeanum* contained half as much total N as the controls, owing to a decrease in hot-water-insoluble N compounds. No significant differences in N content between diseased and healthy leaves were detected with *Uromyces vignae* on cowpea, *Peronospora manshurica* on soybean, *Pseudoperonospora cubensis* on cucumber, *Phytophthora infestans* on tomato, or *Cercospora hibisci* on 'mukuge' [*Hibiscus esculentus*]. The sap and heartwood of pine infected by *Cronartium quercuum* contain more nitrogenous compounds than that of healthy pine.

SAKAI (R.). **Physiological studies on Phytophthora infestans (Mont.) de Bary. Part 5. On the metabolism of amino acid in Phytophthora infestans. Part 8. Effect of vitamins on growth of Phytophthora infestans.**—*Res. Bull. Hokkaido agric. Exp. Sta.* 72, pp. 1–7, 5 graphs; 73, pp. 88–93, 2 fig., 3 graphs, 1957. [Japanese. Abs. from English summaries.]

In further studies on the metabolism of *P. infestans* [**36**, p. 548; **37**, p. 106; and below] D-amino acids were oxidized by mycelium extract but the enzyme for L-amino acids was inactive in ground mycelium. Enzyme activity was greatest when the growth rate of the fungus was at a maximum. Of 2 amides and 18 amino acids asparagine was utilized the most rapidly. Amino acid metabolism was similar in mycelium grown either on potato decoction or on an asparagine-glucose medium. Of 9 vitamins added separately to a basal medium containing mineral salts, asparagine, and glucose, only thiamine was beneficial to growth.

SAKAI (R.). **Physiological studies on the Phytophthora infestans (Mont.) de Bary. Part 6. On the metabolic product of Phytophthora infestans. I. Paper chromatography of organic acids.**—*Ann. phytopath. Soc. Japan*, **21**, 1, pp. 4–8, 2 fig., 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further studies in this series [see above] the principal organic acid detected in culture filtrates of *P. infestans* was oxalic acid.

NEWTON (W.). **The utilization of single organic nitrogen compounds by Wheat seedlings and by Phytophthora parasitica.**—*Canad. J. Bot.*, **35**, 4, pp. 445–448, 1 fig., 1957.

At the Plant Pathology Laboratory, Saanichton, British Columbia, the growth of wheat seedlings under aseptic conditions and of *P. parasitica* [**36**, p. 205] was supported by L-alanine as the nitrogen source but not by D-alanine, which was toxic. Similar results were obtained with D- and L-leucine and with glycine. Urea barely permitted the growth of *P. parasitica* but helped the growth of wheat.

Katsura (K.) & Takemura (S.). **Influence of malachite green upon the sporangial germination and mycelial growth of the fungus, Phytophthora palmivora Butler, isolated from fig fruit.**—*Sci. Rep. Saikyo Univ. Agric.* 8, pp. 107–111, 1 fig., 1956. [Japanese. Abs. from English summary. Received 1957.]

The limiting concentration of malachite green [**35**, p. 915] in potato decoction liquid permitting germination of sporangia of *P. palmivora* from inoculated egg-plants was $0{\cdot}5 \times 10^{-3}$%, and in distilled water $0{\cdot}2 \times 10^{-3}$%; at 1×10^{-5}% indirect germination was stimulated. On potato decoction agar mycelial growth was retarded at $0{\cdot}5 \times 10^{-4}$% and prevented at 1×10^{-2}%.

Katsura (K.). **Studies on the physiology of sporangial germination of Phytophthora capsici Leonian. I.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 8, pp. 97–106, 2 fig., 1956. [Japanese. Abs. from English summary. Received 1957.]

Sporangia of *P. capsici* [cf. **35**, p. 915] liberated zoospores only in the presence of free water; at R.H. 100% after 20 hr. 1·8% sporangia germinated by germ tubes. At 25° C. zoospore emission began after 4–8 min., and at 20–21° 1·4% germination had occurred after 15 min. Direct germination, but not indirect, took place in juice from eggplant, tomato, cucumber, pear, Japanese persimmon, and loquat, but not onion. In 1% tomato juice at pH 5·4 or distilled water at pH 5–5·6 zoospores germinated inside the undehisced sporangium by putting germ tubes through the sporangial wall. The limiting pH for indirect germination lay between 4·8 and 5.

Katsura (K.), Harada (K.), & Murakami (M.). **The flagella of zoospores of Phytophthora capsici Leonian as viewed with the phase contrast microscope.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 71–73, 3 fig., 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

A description is given of the structure and behaviour of flagella of zoospores of *P. capsici* under the phase contrast microscope at the Faculty of Agriculture, Saikyo University. After some movement a spherical body appears midway on each flagellum, which is then shed or withers.

Kimura (K.), Yagi (K.), Katsuki (H.), & Takahashi (M.). **On the sporulating substance of Pythium ultimum.**—*Ann. phytopath. Soc. Japan*, **21**, 4, pp. 171–174, 4 graphs, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

At the Faculty of Science, University of Kyoto, spore [? oospore] formation in *P. ultimum* was found to be promoted by an unstable, light-sensitive substance present in maize and carrot.

Mazur (P.). **Studies on the effects of subzero temperatures on the viability of spores of Aspergillus flavus.**—*J. gen. Physiol.*, **39**, 6, pp. 869–888, 3 graphs, 1956.

At the Biological Laboratories, Harvard University, the survival of spores of *A. flavus*, suspended in distilled water and cooled rapidly to −70 to −75° C. (at the rate of 250°/min.), was found to depend primarily on the rate of subsequent warming. After slow warming (0·9°/min.) only 7% germinated, whereas after rapid warming (700°/min.) 75% germinated. With warming rates ranging from 0·12–1000°/min. the log. of the percentage germination was a linear function of the rate of subzero warming. Slow warming was more lethal between −20° and 0° than between −70° and −20° and more so than a 1–2 hr. exposure to constant temps. between −70° and 0°. Slow, as opposed to rapid, warming was more harmful when the spores were suspended in horse serum, 0·16M NaCl sol., 0·29M sucrose sol., or distilled water.

Butler (Gillian M.). **The development and behaviour of mycelial strands in Merulius lacrymans (Wulf.) Fr. I. Strand development during growth from a**

food-base through a non-nutrient medium.—*Ann. Bot., Lond.*, N.S., **21**, 84, pp. 523–537, 1 fig., 1957.

At the Botany School, University of Cambridge, strand development by *M. lacrymans* [cf. **36**, p. 706] was followed by direct observation of surface growth from a wood food-base over a moist, non-nutrient medium (porous plant-pot chippings, 3–6 mm.) contained in glass tubes.

Strand initiation occurred in mycelium of a relatively restricted physiological age, some distance behind the margin. New growth in the older parts of the mycelium took the form of an increase in thickness of some of the strand initials, except where the strands 'sprouted'. No visible surface maturation of strands was noted, and some continued to increase in thickness throughout the longest experimental period. In the tubes the rate of strand formation remained constant with increasing distance from the food-base, longitudinal systems of strands being built up. There was a consistent reduction in the mean number of strands with increasing distance from the food-base, except at 20 cm., where the amount of stranding may have been influenced by the proximity of the end of the porous-pot column. As mean strand diameter also tended to decrease, the changes reflected a reduction in the amount of mycelium involved in strand development; they could not be ascribed to branching and reuniting of strands along the length of the tubes. Altering the size of or distance from the food-base appeared to affect the density of the mycelium and strands more than the growth rate of individual hyphae of the mycelial margin.

Sison (B.), Schubert (W. J.), & Nord (F. F.). **Isolation of a cellulolytic enzyme from the mold Poria vaillantii.**—*Arch. Biochem.*, **68**, 2, pp. 503–504, 1 fig., 1957.

A cellulolytic enzyme attacking both cotton and wool cellulose was isolated from the filtrates of 6-weeks-old cultures of *P. vaillantii* at Fordham University, New York.

Flentje (N. T.). **Studies on Pellicularia filamentosa (Pat.) Rogers. III. Host penetration and resistance, and strain specialization.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 322–336, 2 fig., 1957. [26 refs.]

In this further contribution from the Waite Agricultural Research Institute, Adelaide, S. Australia [**36**, p. 618], the methods of infection of several hosts by a root-attacking isolate of *Pellicularia filamentosa* [*Corticium solani*] were compared with those of stem-attacking isolates and are described in detail. Before forming appressorial structures characteristic of the particular strain the fungus produced a mucilaginous sheath within which it grew along the host surface. In stem-attacking forms hyphal growth took place exclusively along the lines of junction of the epidermal cells and penetration by fine infection pegs occurred from the appressoria, leading to progressive invasion of the host. In host-parasite combinations which did not result in such invasion breakdown of the infection process took place at one of four stages: (i) failure of the hyphae to attach themselves to the host surface; (ii) their failure to form appressoria; (iii) thickening of the host cell wall preventing penetration; and (iv) killing of the hyphae after penetration by a hypersensitive reaction resulting in small, necrotic flecks. This latter was confined to lettuce stems, leaves and petioles being progressively invaded, when attacked by crucifer strains of *C. solani*. The hypersensitive reaction of the host was lessened by exposure to reduced light intensity.

Abeygunawardena (D. V. W.) & Wood (R. K. S.). **Factors affecting the germination of sclerotia and mycelial growth of Sclerotium rolfsii Sacc.**—*Trans. Brit. mycol., Soc.*, **40**, 2, pp. 221–231, 1957.

Two isolates of *S. rolfsii* [see below], one from tomato plants in Ceylon and the other from groundnut plants in Ghana [cf. **36**, p. 633], were investigated in the

Botany Dept, Imperial College, London. They differed in their ability to utilize lactose and nitrate nitrogen and in the numbers and size of sclerotia produced.

Both grew well on a variety of media; on agar the opt. for growth was at 30° C., and in liquid media between 20 and 30°. The Ceylon isolate produced no sclerotia at 10 or 40° and max. wt. of sclerotia was obtained at 30°, whereas the Ghana isolate produced substantial amounts of sclerotia only at 10 and 30°, those at 10° remaining white for a long period, but browning at higher temps. The optimum pH was near 3; both isolates caused a rapid drop in the pH of media to between 2·5 and 4.

Germination of the sclerotia was good in thin films of distilled water but was reduced on the surface of a fertile soil (more so when buried at 20 mm.) and in soil with over 75% moisture holding capacity. Good germination was obtained, however, in aerated soil or water.

Abeygunawardena (D. V. W.) & Wood (R. K. S.). **Effect of certain fungicides on Sclerotium rolfsii in the soil.**—*Phytopathology*, **47**, 10, pp. 607–609, 1957.

At Imperial College, London, soils contaminated with sand-maize cultures or buried sclerotia of *S. rolfsii* were used to test the ability of a number of soil fumigants and fungicides to control the fungus [cf. **20**, p. 618; **32**, p. 433; **33**, p. 276], inhibition being assayed by germination of recovered sclerotia or by counts of healthy sugar beet seedlings produced in the soil. Formalin or DD added to soil below the sclerotia did not kill them, nor did SR 406 or sodium dehydroacetate applied as a drench to the soil surface, but chlorobromopropene at 0·6 and 1 ml./1,200 g. soil as a fumigant or 2% formalin as a drench killed nearly 100%. On the other hand, in soil infested with mycelium sodium dehydroacetate and SR 406 (500 ml. of 0·5% suspension/1,200 g. soil) and formalin (500 ml. 2% sol.) gave over 70% stand of seedlings compared with 30% in the control, but SR 406 proved phytotoxic. Chloropicrin as a fumigant was also effective, but chlorobromopropene was too phytotoxic. Used as dusts mixed with the upper soil SR 406 and PCNB at 0·2–0·8% gave excellent control, but tecnazene [**36**, p. 603] was highly phytotoxic when strong enough (0·8%) to give control.

Johnson (L. F.). **Effect of antibiotics on the numbers of bacteria and fungi isolated from soil by the dilution-plate method.**—*Phytopathology*, **47**, 10, pp. 630–631, 1957.

At the University of Tennessee, Knoxville, it was found that of a number of polycycline antibiotics substituted for streptomycin to check bacterial growth in soil plates [**29**, p. 433] chlortetracycline at 2–0·25 μg./ml. reduced bacterial contamination most effectively and allowed growth of more [unspecified] fungus species. It was used in the form of crystalline aureomycin, buffered with sodium glycinate; it should be freshly prepared, and is unstable at pH 7 or higher.

Park (D.). **Behaviour of soil fungi in the presence of bacterial antagonists.**—*Trans. Brit. mycol. Soc.*, **40**, 2, pp. 283–291, 1957.

At the Dept of Cryptogamic Botany, University of Manchester, the reactions to bacterial antagonists of six soil fungi and six fungi from a number of sources were compared in an attempt to differentiate between native soil fungi and alien fungi [see below]. In one series of experiments the antagonism was provided by organisms in soil treated with propylene oxide and in the other by *Bacillus macerans* [**36**, p. 125]. In agar and liquid cultures there was no difference in reaction between the two categories of fungi, but in sand and soil there were differences in behaviour. However, the distinctions were between soil inhabitants generally and fungi from other sources, not between alien fungi and those native to a particular soil. The term 'exochthonous' is suggested for fungi not normally inhabiting the soil and not able to maintain themselves in an active condition there, in contrast to 'autochthonous' or soil-inhabiting fungi, adapted to this medium.

Park (D.). **Behaviour of soil fungi in the presence of fungal antagonists.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 358–364, 2 fig., 1957.

In a continuation of these studies [see above] the reaction of soil-inhabiting fungi to fungal antagonism was compared with that of exochthonous fungi, the same 12 fungi being used and the 6 aliens being classified as 5 exochthonous and 1 soil-inhabiting. In mixed cultures of fungi from both categories the true soil-inhabitants became dominant but the spores of the exochthonous fungi remained viable. Under conditions of bacterial antagonism which inhibited growth of the soil-inhabitants, spores of the exochthonous fungi added to the cultures remained demonstrable. It was found, however, that whereas the soil-inhabitants were able to maintain themselves in mixed cultures without added bacteria, that is under conditions approximating to those of soil, the exochthonous fungi were not, as demonstrated by failure to re-isolate them from the cultures. It is suggested that exochthonous fungi possess a lower tolerance of antagonistic activity than do soil-inhabitants.

Warcup (J. H.). **Studies on the occurrence and activity of fungi in a Wheat-field soil.**—*Trans. Brit. mycol. Soc.*, **40**, 2, pp. 237–259, 1 pl., 3 graphs, 1957.

At the Waite Institute, Adelaide, S. Australia, the occurrence and activity of fungi in a wheat field soil were investigated by plating methods [**36**, p. 125] and by direct isolation [**34**, p. 546]. Soil samples were collected at 1-, 3-, and 6-in. depths. Results obtained by the dilution and soil plate methods were essentially similar, but the picture of the soil flora given by hyphal isolations was quite different. The varied findings by these methods are discussed in detail. The most abundant fungi isolated by dilution methods were species of *Penicillium*, *Rhizopus*, *Mucor*, *Cladosporium*, and *Fusarium*, whereas by hyphal isolations a high proportion of fungi rare or absent from the dilution plates were obtained, including some basidiomycetes and many sterile isolates. The soil plate method tended to favour medium- to fast-growing fungi present in relatively low numbers. Detailed observations on *R. arrhizus* indicated that many fungi recorded frequently during the year by soil and dilution plates may yet be active only in very restricted areas or for short periods.

Similar numbers of fungi were obtained from depths of 1 and 3 in. but significantly fewer at 6 in. Numbers also fluctuated according to the season, being highest during the wet winter; during the hot, dry summer fungi survived as spores or hyphae, or as rhizomorphs or sclerotia.

Over 210 species were isolated in this study, the highest number yet recorded from one soil. Among the 23 phycomycetes were several *Pythium* spp. which were rarely obtained during the summer but were always present in low numbers at other times of the year. *R. arrhizus*, *Mucor* W 13, *Absidia butleri*, and *Mortierella* spp. were all abundant; *Mucor* and *Mortierella* were found fruiting in worm tunnels after rain. Thirteen species of ascomycetes were isolated, the commonest being *Thielavia* sp. and a species of *Arachniotus*, generally from lower depths. *Ophiobolus graminis* was occasionally found. Of the 10 basidiomycetes, only two, a *Lepiota* and *Pellicularia filamentosa* (*Rhizoctonia* [*Corticium*] *solani*) were identified. All the isolates of *C. solani* belonged to the crucifer strain [**37**, p. 145]. The most common species of *Aspergillus* were *A. terreus* and *A. flavus*; among the Fusaria, *F. oxysporum* was the most abundant. *Penicillium* W 2 was frequent and evenly distributed, but *P. urticae*, although common, was erratic in its distribution.

The numbers of fungi present in the soil were greatly increased by cultivation or the incorporation of wheat residues, as were the numbers of bacteria, but actinomycetes showed comparatively little change.

Herr (L. J.). **Soil mycoflora associated with continuous cropping of Corn, Oats, and Wheat.**—*Ohio J. Sci.*, **57**, 4, pp. 203–211, 2 graphs, 1957.

At Ohio Agricultural Experiment Station the soil from plots cropped continuously

since 1915 with maize [**37**, p. 77], oats, or wheat, was assayed for fungi by dilution-plates. Four were predominant: *Aspergillus fumigatus* in the oat plot, *Penicillium funiculosum* in the maize plot, and the first named together with *Trichoderma* spp. and *Fusarium* spp. equally frequent in the wheat plot. *T.* spp. were never isolated from the oat plot.

WAID (J. S.). **Distribution of fungi within the decomposing tissues of Ryegrass roots.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 391–406, 1 pl., 6 graphs, 1957.

At the Grassland Research Institute, Hurley, Berks., the fungus populations of different parts of decomposing ryegrass (*Lolium perenne*) roots were investigated by direct observation of stained tissue and by a plating technique already described [**36**, p. 341]. Roots exhibiting 3 different degrees of cortical decomposition were examined and the flora of the root surface, outer cortex, and inner cortex studied. The mycelial population of the surfaces of intact roots proved to be the most active. As root degradation proceeded, fungal activity increased in each zone, but did not equal the gradient of activity across the cortex. A characteristic succession was found in each zone of the cortex, primary colonizers being fungi with low saprophytic ability and secondary colonizers fungi commonly isolated from soils and with high saprophytic ability.

WARINGTON (KATHERINE). **The influence of the pH of the nutrient solution and the form of iron supply on the counteraction of iron deficiency in Peas, Soybean and Flax by high concentrations of molybdenum.**—*Ann. appl. Biol.*, **45**, 3, pp. 428–447, 36 graphs, 1957.

An account is presented of further experiments conducted at Rothamsted in relation to the prevention of iron-deficiency chlorosis in peas, soybean, and flax [cf. **33**, p. 755] and the rates of pH change and Fe precipitation in nutrient solutions of varied pH, containing different combinations and levels of Fe and Mo. It is suggested that Mo, in offsetting chlorosis, forms a complex with P in acid solution, which renders Fe more available by delaying the formation of ferric phosphate. It occurs only when organic Fe is supplied.

HIRATA (K.). **Additional list of the host plants of powdery mildews in central Japan.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 88–91, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

A list is given of 100 plants not previously recorded as hosts of powdery mildews [Erysiphaceae] in central Japan [cf. **31**, p. 577], determined at the Faculty of Agriculture, Niigata University.

WATERHOUSE (GRACE M.). **Phytophthora citricola Sawada (syn. P. cactorum var. applanata Chester).**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 349–357, 1 pl., 3 fig., 1957.

Following a comparison of *P. citricola* and *P. cactorum* var. *applanata*, it is concluded that they are the same. Reasons for maintaining a separation between *P. citricola* and *P. cactorum* are presented.

WAKSMAN (S. A.). **Species concept among the actinomycetes with special reference to the genus Streptomyces.**—*Bact. Rev.*, **21**, 1, pp. 1–29, 1957. [73 refs.]

From the Institute of Microbiology, Rutgers University, New Brunswick, New Jersey, the author reviews the classification of the Actinomycetes, considered to belong to the true bacteria and to be closely related to the mycobacteria and corynebacteria. There is difficulty in separating species of *Streptomyces* and *Nocardia*, especially non-sporulating forms of the latter. Synthetic and organic media permit fairly close identification of the majority of newly isolated cultures. Minor quanti-

tative and even certain qualitative points of difference from the standard descriptions seldom justify the erection of new species. Biochemical characteristics, such as the ability to produce new antibiotics [**37**, p. 140], justify the setting up of a new species only when accompanied by morphological or cultural differences. Consideration must be given to variations, whether natural or produced during degeneration on natural media, and a new species name should not be assigned until detailed study has been made of the limits of variation of the culture.

Nobles (Mildred K.), Macrae (Ruth), & Tomlin (Barbara P.). **Results of interfertility tests on some species of Hymenomycetes.**—*Canad. J. Bot.*, **35**, 3, pp. 377–387, 1957.

The results are presented of interfertility tests used to investigate the polarity of 26 heterothallic species of hymenomycetes, mostly Polyporaceae, at the Botany and Plant Pathology Laboratory, Ottawa, Ontario.

Nixon (H. L.) & Sampson (J.). **A study of healthy and virus-infected plant cells by thin-section methods.**—*Proc. int. Conf. Electron Microscopy, 1954*, pp. 251–255, 1 pl., 1 fig. [? 1956. Received 1957.]

An account is given of preliminary work at Rothamsted Experimental Station to ascertain whether electron microscope pictures of thin sections can be made to give useful information on the nature and site or sites of plant virus multiplication. The appearance of the major cell-components of healthy tobacco plants is compared with that of cells infected by tobacco mosaic virus [cf. **35**, p. 584], and the site of virus multiplication is discussed in the light of the results obtained. The technique developed in recent years for fixing, embedding, and sectioning animal tissues can be used successfully, with a few modifications, for plant tissues.

Fulton (R. W.). **A rapid method for partial purification of some unstable plant viruses.**—Abs. in *Phytopathology*, **47**, 9, p. 521, 1957.

Grinding infected tissue with about twice its volume of calcium phosphate paste (calcium phosphate, freshly precipitated from 0·1 M sols. of Na_2HPO_4 and $CaCl_2$, in 0·03 M phosphate buffer (pH 7–8)) and centrifuging for 1 min. or less, gave clear, infective preparations of 3 *Prunus* viruses, rose mosaic virus, and apple mosaic virus, usually unstable in extracts and poorly infective after some 3 hr. Tobacco ring spot, cucumber mosaic, tomato spotted wilt, and peach yellow bud mosaic viruses appeared to be adsorbed and sedimented with the calcium phosphate. Viruses in distilled water preparations were adsorbed, but could be eluted by resuspension of the calcium phosphate in 0·03 M buffer.

Yarwood (C. E.). **A brush-extraction method for transmission of viruses.**—*Phytopathology*, **47**, 10, pp. 613–614, 1957.

Arising from the finding that certain viruses predominate in the epidermis [**34**, p. 207], a method of virus transmission employing a stiff poster brush, stroked in turn over the leaf surface of the donor and the leaf to be inoculated, was successfully used at the University of California, Berkeley, with hairy donor leaves. Carborundum increased the efficiency of the method, and also the use of phosphate in inoculations on bean and cowpea. A number of viruses successfully transmitted in this manner are noted.

Harrison (B. D.). **Soil transmission of Beet ringspot virus to Peach (Prunus persica).**—*Nature, Lond.*, **180**, 4594, pp. 1055–1056, 1957.

At the Scottish Horticultural Research Institute, Dundee, 7 out of 25 peach seedlings grown in soil from a field where beet ring spot virus [**35**, p. 349] had occurred displayed virus symptoms after 12 months in an insect-free glasshouse. When

Chenopodium amaranticolor, *Petunia hybrida*, and cucumber were inoculated with sap from the diseased seedlings symptoms of beet ring spot virus appeared. No symptoms were obtained with inoculations from the 18 healthy seedlings nor from control plants grown in steam-sterilized potting compost. The symptoms of beet ring spot virus in peach are very similar to those caused by peach yellow bud mosaic virus [**35**, p. 286] in California.

Corbett (M. K.). **Local lesions and cross-protection studies with Bean yellow mosaic virus.**—*Phytopathology*, **47**, 9, pp. 573–574, 1 fig., 1957.

At the Agricultural Experiment Station, Gainesville, Florida, it was found that a strain of bean yellow mosaic virus [**36**, p. 809] from peas [**30**, p. 91] and another from red clover [**35**, p. 682] could be distinguished on *Crotalaria spectabilis* [**34**, p. 272] and *Cassia tora*, the former being the more convenient in practice. The pea strain caused local lesions on *C. spectabilis* followed by stem and tip necrosis; the clover strain caused no symptoms on the inoculated leaves, but later produced a marked chlorotic mottle. When inoculated with the clover strain plants developed a mottle in 20–30 days and proved to be protected against systemic infection by the pea strain. No protection was given against tobacco ring spot virus, to which *C. spectabilis* is also susceptible.

Proceedings of the Cacao Breeding Conference held at the West African Cocoa Research Institute, Tafo, Ghana, 1–3 October, 1956.—49 pp., London, Crown Agents for Overseas Governments and Administrations, 1957. 7*s*. 6*d*.

In the first session of this Conference, devoted to breeding for disease resistance, W. T. Dale (pp. 3–6) described studies at Tafo on resistance to and tolerance of cacao viruses [**36**, p. 385]. It is emphasized that testing for resistance is long and laborious. So far tests have been made only on young material and there is some indication that resistance increases with age. A trial with T 17 cuttings to investigate reaction to the Kpeve strain of cacao swollen shoot virus is in progress. Early results indicate a greater degree of resistance than to the New Juaben strain.

Resistance and tolerance with respect to black pod disease (*Phytophthora palmivora*) [loc. cit.] are discussed by A. L. Wharton (pp. 7–9), who cites 3 examples of resistant or tolerant material found outside Ghana, the only ones known: these are the susceptible but highly tolerant Lafi No. 7 from Samoa [**35**, p. 170], the resistant clone SIC 28 from Brazil [loc. cit.], and 12 B from the Cameroons, which bears heavily in the dry season and escapes infection.

In the pathology section of the statement on cacao breeding at W.A.C.R.I. (pp. 35–36) G. D. H. Bell and H. H. Rogers note that while there is little hope of finding inherent resistance to swollen shoot virus it may be possible to utilize tolerance. It is not yet known how the use of tolerant material would increase yield. Sufficient information is not yet available to enable a breeding programme for resistance to *P. palmivora* to be established.

Hanna (A. D.) & Heatherington (W.). **Arrest of the swollen-shoot virus disease of Cacao in the Gold Coast by controlling the mealybug vectors with the systemic insecticide, dimefox.**—*Ann. appl. Biol.*, **45**, 3, pp. 473–480, 1 graph, 1957.

In an experiment conducted on a 13-acre plot in a devastated area in Eastern Province, Ghana, to determine whether the systemic insecticide dimefox when applied to the soil affected the spread of cacao swollen shoot [cf. **33**, p. 414; **36**, p. 385], a total of 8,600 trees, of which 1,266 displayed symptoms of the disease at the beginning of the work, were treated 9 times at intervals of 8 weeks with 50% dimefox at the dosage prescribed by the girth-weight correlation curve. Mature trees were not harmed by the treatment. All the trees were examined at monthly intervals, and those showing symptoms were recorded and eventually cut out. The 1st cutting

out was effected in Aug. 1952, 6 weeks after the first application of dimefox; the 2nd was in May 1953, 6 weeks after the 6th treatment; the 3rd was in Oct. 1953, 6 weeks after the final application; and the 4th and subsequent cutting out took place each month up to Aug. 1955. The 3 control plots were as similar as possible in disease incidence, though differing somewhat in other respects.

The number of trees appearing with symptoms each month decreased very rapidly 12 months after the first chemical treatment and their numbers remained low for the duration of the experiment. This suggests that the period between infection and the development of symptoms can extend to about 1 year. On the control plots the initial percentage of diseased trees was lower than on the chemically treated plot; inspections were made every month and new cases felled. The number of such trees decreased for 12 months after the initial cutting out, and then increased sharply to a high level again. Chemical treatment (costing, with labour, about 3*s.* 7*d.*/tree/application) combined with cutting out gave better control than the latter alone.

Baker (R. E. D.) & Holliday (P.). **Witches' broom disease of Cacao (Marasmius perniciosus Stahel).**—*Phytopath. Pap. Commonw. Mycol. Inst.* 2, 42 pp., 14 pl., 2 fig., 7 graphs, 1 map, 1957. 12*s.* 6*d.* [133 refs.]

In this comprehensive monograph the history, host range, symptoms, life history, development, epidemiology, climatic range, and control of witches' broom of cacao [map 37] are described, discussed, and summarized [see below].

Holliday (P.). **Further observations on the susceptibility of Imperial College selections to witches' broom disease.**—*Rep. Cacao Res. Trinidad, 1955–6*, pp. 48–53, 1957.

Further examination for susceptibility to witches' broom [*Marasmius perniciosus*: **35**, p. 427] of the cacao clones grown at the Imperial College of Agriculture, Trinidad, again demonstrated that wide variations exist and that, as a rule, clones most susceptible to pod infection produce most brooms. In CRB experiments 6 and 11–14, the most resistant clones so far are ICS 1, 23, 27, 31, 46, 49, and 73, and the most susceptible ICS 36, 39, 40, 43, 67, 74, and 87. Of 46 ICS clones examined by far the best is ICS 95.

Havord (G.). **Leaf symptoms of deficiencies of calcium and magnesium in Cacao.** —*Rep. Cacao Res. Trinidad, 1955–6*, pp. 27–29, 2 col. fig., 1957.

After referring to the differing descriptions of leaf symptoms of calcium and magnesium deficiency in cacao given by Maskell, Evans, and Murray in Trinidad (A report on Cacao research, 1945–51, pp. 53–56, Imperial College of Tropical Agriculture, 1952), Greenwood and Djokoto in the Gold Coast [**32**, p. 548], and Machicado and Alvim in Costa Rica (*Proc. 5th Conf. Inter-Amer. tech. Cacao Comm., 1954*) [cf. **35**, p. 4], the author describes experiments with cacao seedlings grown in nutrient solution lacking calcium and magnesium in which symptoms corresponding to those described by Maskell *et al.* were consistently obtained, except that no white spots were observed. The magnesium deficiency symptoms agreed with those described by Machicado and Alvim, and were quite different from those reported by the other workers. The discrepancies are mainly related to the presence or absence of marginal and tip necrosis; marginal chlorosis requires to be interpreted with caution.

Thorold (C. A.). **A chlorosis disease of Cocoa in the Southern Cameroons.**—*J. W. Afr. Sci. Ass.*, **3**, 1, pp. 96–106, 1 pl., 1 graph, 1 map, 1957.

Observations made from 1951–54 on this chlorosis disease of cocoa [**34**, p. 709], the cause of which is still unknown, are presented. Symptom expression may be

transitory or persistent, chlorotic trees may be otherwise healthy in appearance, and pod production does not seem to be affected. It has not proved possible to transmit the disease by grafting or by mealy bugs, and applications of Zn, Fe, Cu, and Mn have given negative results, though the behaviour of the disease in the field suggests a physiological cause.

Knott (D. R.), **The inheritance of rust resistance. II. The inheritance of stem rust resistance in six additional varieties of common Wheat.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 3, pp. 177–192, 1957.

In further studies [cf. **36**, p. 93] the wheat varieties Africa No. 43, Kenya C9906, Kenya 338.AC.2.E.2, Egypt Na 101, and Red Egyptian type (P.I. 170910) were found to carry various combinations of known genes for resistance to races 15B and 56 of *Puccinia graminis*. The variety Veadeiro possesses mature plant resistance to race 15B governed by 2 additive genes not previously noted.

Johnson (T.) & Green (G. J.). **Physiologic specialization of Wheat stem rust in Canada, 1919 to 1955.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 3, pp, 275–287, 1 graph, 1957. [19 refs.]

This review of the physiologic races of *Puccinia graminis* f. sp. *tritici* in Canada [**36**, p. 686] brings up to date a previous summary [**25**, p. 335] in the light of a number of references, mostly noticed in this *Review*. The influence of extensive cultivation of different wheat varieties on the rust race population is discussed. It is considered that the movement of rust spores from N. to S. at the end of the summer is an important factor in the overwintering of races selectively propagated in the N. The influence of new biotypes of races on varieties in current cultivation and in the course of production, and the use of accessory differential hosts in the identification of these, are described. A brief note is given on the identification of races from infected barberries.

Van Sumere (C. F.), Van Sumere-de Preter (C.), & Ledingham (G. A.). **Cell-wall-splitting enzymes of Puccinia graminis var. tritici.**—*Canad. J. Microbiol.*, **3**, 5, pp. 761–770, 3 graphs, 1957.

At the Prairie Regional Laboratory, Saskatoon, Saskatchewan, evidence was obtained that ground uredospores of *P. graminis* from wheat contain a hemicellulase, a cellulase, and pectinase.

Guyot (L.), Malençon (G.), & Massenot (M.). **De l'existence d'un foyer montagnard de rouille noire du Blé (Puccinia graminis tritici) sur certaines Graminées indigènes du Moyen et du Haut Atlas Marocains.** [On the existence of a mountain focus of black rust of Wheat (*Puccinia graminis tritici*) on certain indigenous Gramineae of the Middle and Upper Atlas in Morocco.]—*C.R. Acad. Agric. Fr.*, **43**, 4, pp. 213–224, 1957.

In the course of a collecting expedition in the Atlas Mountains [cf. **36**, p. 555] *P. graminis* was found on 28 grasses belonging to 16 genera. Notes are presented on the morphology and biology of the fungus on *Agropyron marginatum*, *Haynaldia hordeacea*, *Bromus ramosus*, and *Festuca triflora*. Over a broad area, which the authors define as clearly as their necessarily limited researches permit, most grasses growing between 1,450 and 2,000 m. were infected, and some heavily so. *Berberis hispanica* was present, but aecidia were seldom found. It was concluded that this infection of the mountain grasses constitutes an important reservoir of rust infection in Morocco.

Cialzeta (C.). **Magnif Guaraní M.A.G., nueva variedad de Trigo.** [Magnif Guaraní M.A.G., a new Wheat variety.]—Abs. in *Idia*, **8**, Oct.–Dec., p. 29, 1956.

From the Instituto de Fitotecnia, Castelar, Argentina, is reported a commercial

wheat variety Magnif Guaraní M.A.G., derived from the cross (38 M.A.X. Lin Calel 46–11, Rafaela) × Klein Cometa, and approved by the seed inspection office. It has high resistance to race 15 of *Puccinia triticina*, acceptable field resistance to *P. graminis*, good industrial quality (semi-hard), and satisfactory grain yield.

Basile (Rita) & Leonori-Ossicini (Agnese). **Razze fisiologiche di Puccinia rubigo-vera tritici (Erikss. et Henn.) Carl. (=P. triticina Erikss.) in Italia, nel 1953–1954.** [Physiologic races of *Puccinia rubigo-vera tritici* (Erikss. et Henn.) Carl. (= *P. triticina* Erikss.) in Italy in 1953–1954.]—*Ann. Sper. agr.*, N.S., **11**, 4, *Suppl.*, pp. cvii–cxiii, 1957. [English summary.]

This information on wheat brown rust races has already been noticed [**36**, p. 579].

Lu (S-I.), Fan (K-F.), Shia (S-M.), Wu (W-T.), Kong (S-L.), Yang (T-M.), Wang (K-N.), & Lee (S-P.). **Studies on stripe rust of Wheat 1. Physiologic specialization of Puccinia glumarum (Schmidt) Erikss. & Henn.**—*Acta phytopath. sinica*, **2**, 2, pp. 153–166, 4 fig., 1956. [Chinese. Abs. from English summary. Received 1957.]

Improved varieties of wheat grown in China were used in studies on different races of stripe rust (*P. glumarum*) [**25**, p. 208]. Li-Yung 1 was resistant to 40 out of 50 collections, Nanking 4197 to 37. Yechow 35368 and Y-ta 1885 were susceptible to all except 5 collections from *Elymus chinense*. Tests with 6 improved varieties enabled the differentiation to be made of 21 out of 50 stripe rust collections into 10 races (Y1–Y10). Races Y2–Y8 were from wheat, Y9 and 10 from *Agropyron* spp., and Y1 mainly from *E. chinense*. The reactions of Early Premium and Li-Yung 1 to collections from N. China were different from those from E. China. All the wheat varieties were resistant to collections from *E. chinense*, but those from *E. sibiricus* and *A.* spp. were capable of attacking many wheat varieties.

Ciferri (R.) & Scaramuzzi (G.). **Suscettibilità delle linee selette italiane di Frumento alle 'carie' e tassonomia delle Tilletia triticicole. Parte I. Risultati delle infezioni in campo.** [The susceptibility of the selected Italian lines of Wheat to bunt, and the taxonomy of the Wheat-inhabiting species of *Tilletia*. Part I. The results of field inoculations.]—*Ann. Sper. agr.*, N.S., **11**, 3, pp. 719–722, 1957. [English summary.]

The results of field tests in 1949 of the susceptibility of 67 Italian varieties of wheat to bunt (*Tilletia* spp.) [cf. **30**, p. 315], artificially produced by chlamydospores from various parts of Italy, presumably representative of most of the physiologic races present in the country, are summarized and tabulated. The experiments included early and late sowings of each variety. Further papers will discuss in detail the data obtained.

Purdy (L. H.) & Kendrick (E. L.). **Influence of environmental factors on the development of Wheat bunt in the Pacific Northwest. I. Effect of soil moisture and soil temperature on spore germination.**—*Phytopathology*, **47**, 10, pp. 591–594, 3 graphs, 1957.

At Washington Agricultural Experiment Station, Pullman, aqueous suspensions of spores of *Tilletia caries* were dried on slides which were then placed in soil (a Palouse silt loam) of known moisture content (9–24%) in closed receptacles, and kept at 5° intervals from 5 to 25° C. Germination after 4 days occurred only at 15 and 20° and at 18 and 24% moisture. After 5 days the best germination at all moisture levels was at 15° and after 10 days it was equally good at 5, 10, and 15° at the higher levels, but at 20 and 25° it was relatively low at all levels. Apparently available moisture is more limiting at high than at low temperatures [cf. **30**, p. 29; **32**, p. 673; **37**, p. 81].

Zscheile (F. P.) & Murray (Hazel (C.). **Chromatographic study of amino-acid development in Wheat ovules in relation to genes for disease resistance.**—*Phytopathology*, **47**, 10, pp. 631–632, 1957.

The results are presented of studies at the University of California, Davis. The relative amounts of the amino acids in the ovules of 11 wheat varieties susceptible to bunt (*Tilletia caries*) and 12 derived resistant ones are tabulated [cf. **36**, p. 181] and specific details for certain varieties are noted. Ovules of the susceptible and resistant varieties differed appreciably in the average content of ethanolamine, lysine, and leucine at anthesis. The data indicate that resistance of wheat to *T. caries* (and also to rust [unspecified]) is not related to the free amino acid pattern of the ovules.

Vallega (J.) & Antonelli (E. P.). **Resistencia a la caries del Trigo.** [Resistance to Wheat bunt.]—Abs. in *Idia*, **8**, Oct.–Dec., p. 34, 1956. [Received Dec. 1957.]

From the Instituto de Fitotecnia, Castelar, Argentina, is reported a renewed search for wheat varieties resistant to *Tilletia controversa* [**35**, p. 433]. Klein Orgullo, Massaux 5, Olaeta Calandria, Buenos Aires 105, and Olaeta Gral are mentioned as being fairly resistant to the disease and Candeal Durumbuck as very resistant.

Glynne (Mary D.). **Eyespot and take-all of Wheat and Barley.**—*Agric. Rev.*, **2**, 10, pp. 10–15, 2 fig., 1957.

This is a brief account of the incidence, symptoms, host-range, factors affecting, and control of eyespot (*Cercosporella herpotrichoides*) and take-all (*Ophiobolus graminis*) of wheat and barley in Great Britain [**36**, p. 815 *et passim*].

Salt (G. A.). **Effects of nitrogen applied at different dates, and of other cultural treatments on eyespot, take-all, and yield of winter Wheat (field experiment, 1953).**—*J. agric. Sci.*, **48**, 3, pp. 326–335, 1 pl., 4 graphs, 1957.

A detailed account and discussion of work already noticed [**35**, p. 152] on *Cercosporella herpotrichoides* and *Ophiobolus graminis* at Rothamsted.

Suzuki (N.), Kasai (K.), Nakaya (K.), Araki (T.), & Takanashi (T.). **Studies in the take-all disease of Wheat. I. The infection process under field conditions.**—*Bull. nat. Inst. agric. Sci., Tokyo*, Ser. C, *1957*, 7, pp. 1–63, 9 pl., 6 fig., 3 diag., 4 graphs, 1957. [Japanese. Abs. from English summary.]

In Japan losses of wheat from take-all (*Ophiobolus graminis*) [**35**, p. 760] did not become severe until 1943, were worst in 1948, and have been decreasing since 1950. The disease is prevalent throughout the country except in Aomori Prefecture and Hokkaido. Losses vary from 20 to 80%, owing to dwarfing of the plants, reduction of tillering, and the amount of grain in the ear. Of 50 isolates from different localities 17 produced perithecia in culture and were pathogenic to wheat, barley, and rye, but few isolates attacked oats.

In inoculation experiments the most severe infection was obtained by placing infected wheat stalks at a depth of 1–1·5 cm. before sowing or in contact with wheat seedlings just after emergence. Spring inoculations usually caused more damage than autumn under favourable weather conditions; late seeding reduced disease severity. In the field the optimum temperature for infection was 5–10° C., but prolonged low temperatures in winter were unfavourable. The conditions predisposing to heavy losses included the establishment of the pathogen in wheat seedlings in the autumn, successful overwintering, and the extent of attack on new roots as soon as they develop in the spring. Under experimental conditions the

maximum spread of the pathogen during the growth period of wheat was 45 cm. In a 4-yr. survey of a naturally infected area no instance was found of *O. graminis* occurring in the subsequent 3 years in the same field or in the same patch in a field.

Hsia (Y-T.), Hsiao (C-P.), & Gao (C-X.). **The development of Gibberella zeae headblight of Wheat. I. Relations of development and dissemination of spores and amount of rainfall to epiphytotics.**—*Acta phytopath. sinica*, **2**, 2, pp. 187–202, 1 fig., 7 graphs, 1956. [Chinese. Abs. from English summary. Received 1957.]

Field investigation by the East China Agricultural Research Institute on *G. zeae* [**29**, p. 118], carried out at Nanking, Kiangsu province, showed that the fungus on the soil surface in inoculated plots produced more ascospores than conidia. The ascospores were the chief source of inoculum for primary infection, the conidia being a main factor in subsequent spread of the disease. The largest number of spores was trapped at 17 cm. above the ground, far fewer being caught at 33 and 117 cm. Splashing rain is considered more important for dissemination than wind. The amount of inoculum in the soil and rainfall were shown to be the most important factors for an epiphytotic; with abundant inoculum and heavy rainfall the disease could increase by 32% within two days even when the plants were near maturity. In 1955 temps. over 20° C. were found to be favourable, but in 1956 temp. had no significant effect on disease development.

Takegami (S.). **Studies on the resistance of Wheat varieties to Gibberella zeae (Schw.) Petch (head blight) and its mechanism. I. Varietal difference of the position of florets in a Wheat spikelet attacked by head blight incipiently and the relationships between the existence of anther corpses in florets and the infection by head blight.**—*Sci. Rep. Fac. Agric. Okayama Univ.* 10, pp. 33–42, 4 fig., 1 graph, 1957. [Japanese. Abs. from English summary.]

From observations on 5 wheat varieties infected by *G. zeae* [**36**, p. 461 and below] during the severe epidemic of May 1956 a correlation was found between incipient infection in a floret and the presence there of dead anthers.

Takegami (S.). **On the relation between the existence of Wheat anthers and the infection of Gibberella zeae (Schw.) Petch.**—*Proc. Crop Sci. Soc. Japan*, **26**, 1, pp. 31–32, 2 diag., 1957. [Japanese. Abs. from English summary.]

At the Faculty of Agriculture, Okayama University, wheat varieties, such as Ejimashinriki, in which some anthers are imprisoned by the glumes and eventually pushed out by the developing grains, were found to be more susceptible to late infection by *Gibberella zeae*, which attacks through exposed dead anthers [see above], than to early infection.

Tomiyama (K.). **Studies on the snow blight disease of winter cereals.**—*Rep. Hokkaido agric. Exp. Sta.* 47, 234 pp., 2 pl., 16 fig., 51 graphs, 1 map, 1955. [Japanese. Abs. from English summary (10 pp.). 152 refs. Received 1957.]

Winter wheat in Hokkaido is attacked by a number of snow blight fungi including *Typhula incarnata* [**37**, p. 33], *T. ishikariensis*, *Sclerotinia graminearum*, and *Fusarium nivale* [*Calonectria nivalis*]. Their distribution is determined by the amount of snow; *S. graminearum* can attack wheat at the lower temperatures prevailing with less depth of snow, while *Typhula* spp. cannot. The spores of *T. incarnata* and *S. graminearum* are able to germinate at 0° C.; the optimum temperature for hyphal growth is 7–15°. *T. incarnata* is present as sclerotia in the soil and its lesions spread most rapidly at 5°, ceasing to develop at −5°, whereas lesions of *S. graminearum* spread most rapidly at −2°, and are greatly checked even at 0·5°. In culture these two pathogens were mutually antagonistic.

Soil-borne sclerotia are the most important source of *T. incarnata* infection; transmission by spores is of minor importance. Infection takes place through wounds in wheat leaves, young leaves being more susceptible to *T. ishikariensis* and older ones to *T. incarnata*.

In inoculation experiments spraying with a spore suspension of *S. graminearum* failed to induce the disease, but successful inoculation was obtained through wounds or by touching healthy leaves with diseased.

Older wheat leaves are more resistant to the spread of *T. incarnata* than younger ones, owing to the greater mechanical resistance of the epidermis, as determined by a Jolly spring balance, although the physiological defence reaction to infection was lower in the older leaves. The results of inoculations depended on the age of the cultures of *T. incarnata*, fresh cultures being the most virulent. The decrease in physiological resistance in older leaves may also be due to changes in composition of the cell sap.

The severity of snow blight is not affected by the length of time the snow lies, unless it is exceptionally short. Wheat plants which had been buried under snow for 173 days were only slightly blighted. Injury was milder when normal amounts of fertilizer were used than when amounts were reduced. P deficiency caused an increase in *S. graminearum* injury but N and K had little effect.

Among the wheat varieties cultivated in Hokkaido, Akasabishirazu No. 1 and Norin No. 8 are resistant to *Typhula* and *S. graminearum*, and Dawson No. 1 is resistant to *Typhula* and moderately resistant to *S. graminearum*. Akakawa-aka No. 1 is susceptible to both pathogens, and Norin No. 6 is very susceptible to *S. graminearum* and moderately resistant to *Typhula*. Snow blight was controlled by one dusting with an organic mercury fungicide such as ceresan, ruberon, or neomercuron applied in late autumn. Copper-containing dusts or sprays were less effective.

WANG (K-N.), HORNG (S-V.), & CHOW (C-P.). **On the ascospore germination of Gibellina cerealis Pass.**—*Acta phytopath. sinica*, 2, 2, pp. 167–173, 1956. [Chinese. Abs. from English summary. Received 1957.]

The white straw disease of wheat caused by *G. cerealis* [cf. **10**, p. 92] has recently been prevalent in localized areas in N. China. Ascospores released from the debris of diseased plants left in the soil apparently play an important part in reinfection. At the N. China Agricultural Institute it was found that the presence of wheat seedling tissue (e.g. leaf blades, rootlets, or germinating seed) is necessary to induce the spores to germinate. Contrary to Ferrari's finding [loc. cit.], it was shown that at least 10–20% can germinate soon after harvest, low temperatures close to the freezing-point being very effective for their maturation.

SLYKHUIS (J. T.), ANDREWS (J. E.), & PITTMAN (U. J.). **Relation of date of seeding winter Wheat in southern Alberta to losses from Wheat streak mosaic, root rot, and rust.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 2, pp. 113–127, 1 fig., 12 graphs, 1957.

In southern Alberta diseased, immature wheat plants most frequently harbour wheat streak mosaic virus [**36**, p. 237] and its vector, *Aceria tulipae*. In seeding experiments losses from the disease were greatest in winter wheat sown before affected winter or spring wheats nearby were mature. Infection was, however, rare in wheat that emerged after the diseased crops had matured and it could only spread from diseased volunteer wheat so long as it was living, or until the cold weather (Oct. or Nov.) set in. Damage was more severe in wheat sown in Aug. than in that sown later. Early Sept. is, therefore, regarded as the best sowing date for winter wheat in this region.

In tillage experiments a mouldboard plough proved preferable to shallow tillage

implements, as it effectively buried trash from a heavy growth of diseased, immature winter wheat below the seed bed, thus rendering the field immediately safe for sowing.

Machacek (J. E.) & Wallace (H. A. H.). **A study of the germination of Barley seed treated to control loose smut.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 1, pp. 59–68, 1957.

At the Plant Pathology Laboratory, Winnipeg, treatment of barley seed by the water-soak and spergon methods against loose smut (*Ustilago nuda*) [cf. **36**, p. 463] reduced germination, the latter method causing the greater injury. Ungerminated seeds were usually dead, but some may have been rendered dormant. Variation in the response of different lots of seed of the same variety was as great as among different varieties, the factor responsible apparently being the condition of the seed at the time. Susceptibility to the two treatments was closely correlated. Improved germination with ceresan M treatment was related to the reduction caused by the other two treatments, in that the reduction results from mechanical injuries, which are protected by ceresan M. Spergon and water-soak destroyed a part of the *Alternaria* contamination usually present in such seed, but ceresan M was more effective against *Alternaria*, which was hardly suppressed at all by the anaerobic-incubation method [**34**, p. 590].

It is suggested that injury affecting germination could be due to temperatures above 126° F. in the hot-water treatment, to the duration of the soaking period in the water-soak treatment, and to the combined effect of immersion and phytotoxicity with spergon. For the anaerobic-incubation treatment tolerance of anaerobic conditions is probably the important factor.

Richards (L. T.). **Effect of insecticides and herbicides applied to soil on the development of plant diseases. I. The seedling disease of Barley caused by Helminthosporium sativum P.K. & B.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 3, pp. 196–204, 2 pl., 4 graphs, 1957.

At the Science Service Laboratory, Canada Dept of Agric., London, Ontario, 19 insecticides and herbicides were separated into four groups on the basis of their effects on *Helminthosporium sativum* [*Cochliobolus sativus*: see below] on barley seedlings when applied to infested soils. Two, maleic hydrazide and heptachlor, increased the severity of infection. Root rot was reduced by aldrin, endrin, chlordane, N-1-naphthyl phthalamic acid, 2,4-D, monuron, dinoseb, and dalapon. As only dinoseb was at all toxic to *C. sativus* in culture, it is concluded that in other instances the action of the chemicals was so to alter the host metabolism that it affected its reaction to the disease.

Ludwig (R. A.). **Toxin production by Helminthosporium sativum P.K. & B. and its significance in disease development.**—*Canad. J. Bot.*, **35**, 3, pp. 291–303, 2 pl., 8 graphs, 1957.

At the Science Service Laboratory, London, Ontario, the production of toxins by *H. sativum* [*Cochliobolus sativus*: **36**, pp. 183, 454] in culture was shown to reach a maximum limited by the effect of the toxins on the organism itself. Toxin production was evaluated by its effect on germinating barley seed [see above].

The toxins produced under these experimental conditions were not specific and affected wheat, barley, and oats to the same extent. In a comparison of the pathogenicity of a limited number of isolates of *C. sativus*, the most pathogenic produced the most toxin.

When toxic culture filtrates were applied to barley seedlings many of the symptoms characteristic of seedling blight were reproduced, including stunting, chlorosis, and loss of tropic responses.

It is concluded that the toxins affect susceptible hosts by facilitating invasion by the pathogen, but that since strains of *C. sativus* differ in their ability to attack barley seedlings even in the presence of abundant toxin, other factors are involved in pathogenicity.

SKOROPAD (W. P.) & GRINCHENKO (A. H. H.). **A new spore form in Rhynchosporium secalis.**—*Phytopathology*, **47**, 10, pp. 628–629, 1 fig., 1957.

At the Science Service Laboratory, Edmonton, Alberta, hyaline, globose-oblong microconidia, $2{\cdot}5\text{–}7{\cdot}5 \times 1{\cdot}5\text{–}2{\cdot}5\,\mu$, formed on the older mycelium of *R. secalis* on nutrient agar.

FAVRET (E.). **La resistencia de la Cebada a 'Erysiphe graminis'.** [The resistance of Barley to *Erysiphe graminis*.]—Abs. in *Idia*, **8**, Oct.–Dec., pp. 32–33, 1956. [Received Dec. 1957.]

Some new observations on the genetics of resistance of barley to *E. graminis* are reported from the Instituto de Fitotecnia, Castelar. All the genes determining resistance to the 2 races hitherto identified in Argentina [**28**, p. 169] and others in respect of races common to the U.S.A., Japan, and Australia are situated in the second group of chromosomes between 2 limited loci within 50 centimorgans of each other. They comprise 2 gene complexes; one the A-C-M, a large series of alleles and pseudo-alleles which induce high resistance or immunity, the other, designated P., having at least 4 multiple alleles (or pseudo-alleles), confers less resistance. At a relatively short distance from P. is another gene, Z, with similar effect, which has been found in Palmella Blue and Retu from North Africa. Gopal carries 2 genes, one included in the A-C-M complex, and the other, new, is 15–25 units from it. A gene distinct from those hitherto known has been discovered in C.I. 3576 and Mubyan.

HIRATA (K.). **Some observations on the relation between the penetration hypha and haustorium of the Barley mildew (Erysiphe graminis) and the host cell (II). On the collapse of mesophyll cells of the Barley leaves attacked by the mildew.** —*Ann. phytopath. Soc. Japan*, **21**, 1, pp. 23–29, 5 fig., 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

Further study on the host-parasite relationships of *E. graminis* and barley [**35**, p. 760] has shown that in resistant varieties the mesophyll cells adjacent to the epidermal cell in which the first haustorium is formed die a few days after inoculation, thus inhibiting further fungal development. In susceptible varieties mesophyll cells adjacent to infection remain green, while surrounding ones turn chlorotic and die, possibly due to translocation of nutrients away from them towards the site of infection. In both susceptible and resistant varieties the first haustorium develops more easily in an auxiliary cell (not directly in contact with the mesophyll) than in an ordinary epidermal cell.

BRUEHL (G. W.) & TOKO (H. V.). **Host range of two strains of the cereal yellow-dwarf virus.**—*Plant Dis. Reptr*, **41**, 9, pp. 730–734, 1957.

At the Washington State College, Pullman, many grasses were shown to be susceptible to 2 Washington strains of cereal [barley] yellow dwarf virus, one transmitted by both *Macrosiphum granarium* and *Rhopalosiphum fitchii* [**36**, p. 91] and the second only by *M. granarium*, but there are variations in host range between the 2 strains and in comparison with that reported from California [**37**, p. 35]. *Bromus inermis*, immune from both Washington strains, was susceptible in California; the reverse was true of *Phleum pratense*; while *Poa* spp. were susceptible to the first-mentioned Washington strain and resistant to the other.

CAMPBELL (W. P.). **Studies on ergot infection in gramineous hosts.**—*Canad. J. Bot.*, **35**, 3, pp. 315–320, 1957.

At the Plant Pathology Laboratory, Edmonton, Alberta, conidial cultures of 421 isolates of *Claviceps purpurea* [**35**, p. 883] from 38 different hosts were used to inoculate rye, wheat, and barley growing in the greenhouse. All the cultures except one from *Glyceria borealis* were infective to the three cereals. In field and greenhouse tests 46 graminaceous species were infected with honeydew from rye. It is concluded that all indigenous and forage grasses constitute a reservoir of ergot infection for cereal crops.

Second Annual report of the West African Maize Research Unit, 1954.—51+iv pp., 3 graphs, 2 maps, London, Crown Agents for Overseas Governments and Administrations, [? 1957].

In the plant pathology section of this report from Moor Plantation, Ibadan, W. Nigeria, the dimensions are given of a temperature- and humidity-controlled greenhouse for the growth of maize seedlings for rust resistance and other disease tests. Height 2·75 m. to ridge, 2·14 m. to eaves; base 3·05 × 9·15 m. (volume 87·8 cu. m.); roof, $\frac{2}{3}$ glass, $\frac{1}{3}$ wood boarding; extractor fan, 'Trojan' 12 in., situated on the gable under the ridge, extracting 38·8 cu. m. of air per minute. A shaded 'Sunvic' thermostat in the centre of the greenhouse and level with the eaves brings the fan into operation when the temperature reaches 85° F., maintaining temperatures below 95° under full sunlight. Soaking a $\frac{1}{2}$-in. layer of fine gravel laid down each side of the greenhouse maintains a high humidity.

Fungi and diseases of maize in Nigeria are listed by R. H. Cammack. Seedlings of S. African varieties were badly attacked by *Ophiobolus* [*Cochliobolus*] *heterostrophus* [cf. **33**, p. 758]; *Helminthosporium turcicum* and *Diplodia macrospora* affected many of the varieties, 1 of which was largely defoliated by *Physoderma maydis*. Mexican varieties proved highly susceptible to *H. turcicum* and *P. maydis*; the latter affected only 3% of the Italian lines. *Ustilago zeae* [*U. maydis*] was rare on Mexican and uncommon on Italian and Trinidad lines. *Diplodia macrospora* was uncommon on most of the latter but it caused some damage on Mexico 4 and 17 and was common on the Florida lines. Leaf [maize] streak virus caused 2% stunting on the Italian lines. E.A.A.F.R.O. varieties showed a high level of resistance to blight (*H. turcicum*) and to other diseases in the field, though it was sometimes lower in the greenhouse. The S. African, Mexican, Trinidad, and E. African varieties were all resistant to rust (*Puccinia polysora*), the Italian lines less so, and the Florida lines varied.

H. turcicum [cf. **37**, p. 37] has proved to be one of the most troublesome pathogens in W. Africa, with a higher occurrence in humid coastal rain forest areas. Newly introduced varieties, notably those from Central and S. America, are very susceptible. Experimental control by spraying with nabam increased yield by 18%. The E.A.A.F.R.O. varieties are considered generally resistant to the disease, but Florida, Trinidad, and Italian inbreds are only intermediately so, and Mexican and local varieties are all susceptible. Most varieties resistant to *P. polysora* are susceptible to blight.

A volumetric spore trap was used to investigate the behaviour of the spores of the more important diseases on maize at Ibadan, especially *P. polysora* [**35**, p. 383; **36**, p. 523]. The incidence of rust on marked maize stands round the trap was measured at 5-day intervals. The experiment suggested that there is a relationship between the uredospore content of the air 3 m. above the ground and the incidence of rust on the crop. Rust was first observed on 19 May, coming presumably from early-planted plots. The concentration of uredospores began to rise from 5/cu.m. of air on 19 May to 16/cu.m. by the 50% tasselling stage, increasing to 194/cu.m. by 3 July, coincident with 50% death of the maize, when the increased spread of rust occurs on the upper part of the plant.

Messiaen (C. M.) & Lafon (R.). **L'intérêt des méthodes de contaminations artificielles dans l'amélioration du Maïs.** [The interest of methods of artificial infection in Maize breeding.]—*Ann. Amélior. Plantes*, **3**, pp. 383–390, 3 fig., 1956. [English, German, and Russian summaries. Received 1957.]

The authors briefly describe methods of inoculating maize with the principal fungal pathogens of this host in France [cf. **34**, p. 780], i.e., kernel infection by *Gibberella zeae* [**36**, p. 759]; stem infection by *G. zeae* and *Colletotrichum graminicola*, the main agents of foot rot in France; ear contamination by *G. zeae* and *G. fujikuroi*; and leaf infection by *Helminthosporium turcicum*. Three different methods are given for infecting with smut (*Ustilago maydis*), viz., that of Rowell and de Vay [**33**, p. 420] on coleoptiles 1 cm. long; syringing at the level of the last leaf but one, when the panicle first appears; and Lansade's method (*Congrés du Maïs, Pau*, pp. 203–208, 1949) of syringing the ears when the silk emerges. Before any one of these methods is adopted a decision must be made as to whether there is any correlation between the degrees of susceptibility shown at the three stages, and whether different races of smut (as distinct from monosporidial lines) are present. These two points are settled by practising each method with 10 collections of smut spores from different varieties and different localities on the varieties from which the strains have been obtained.

Wood (Jessie I.) & Lipscomb (R.). **Spread of Puccinia polysora with a bibliography on the three rusts of Zea Mays.**—*Spec. Publ. Agric. Res. Serv., U.S. Dept. Agric.*, **9**, 59 pp., 1 fig., 5 maps, 1956. [Received 1957. 204 refs.]

This publication comprises notes and maps on the world distribution of *Puccinia polysora* [map 237], *P. sorghi* [map 279], and *Angiopsora zeae* on maize and other hosts, and a bibliography with abstracts of literature available up to Jan. 1956. References are indexed according to species and their geographical distribution.

Dunin (M. C.). Некоторыи особенности патогенеза пузырчатой головни Кукурузы. [Some peculiarities of the pathogens causing smut on Maize.]—*Trans. Moscow, Ord. Lenin Acad. Agric.*, **1**, pp. 43–60, 1956. [Abs. in *Referat. Zh. Biol.* **14**, p. 205, 1957.]

This is a general account of maize smut (*Ustilago zeae*) [*U. maydis*: **36**, p. 758] including experimental results from U.S.S.R. and other countries.

Szende (K.). **A Kukorica golyvás üszöggombája, Ustilago maydis legzésének vizsgálata.** [Respiratory activity of the Maize smut fungus, *Ustilago maydis*.] —*Agrokém. Talajtan*, **4**, 4, pp. 347–354, 3 graphs, 1955. [Abs. from Russian and English summaries. Received 1957.]

Having previously shown that the haploid sporidial form of *U. maydis* grows well in culture on synthetic media containing organic carbon sources (*ibid.*, **2**, 3, pp. 223–230, 1953), the author reports from the Institute of Genetics of the Hungarian Academy of Sciences, Budapest, a study of the interrelation of morphological form (sporidial (strain T3S), mycelial (MYC), and intermediate (K7R)) and respiratory activity.

The addition of glucose to starved cell suspensions resulted in an increase in respiration in T3S and a decrease in K7R. MYC had a sluggish respiratory activity but sometimes there was an unexplained shift to the sporidial phase when the respiratory rate increased to higher than that of T3S. Data are also given on the effect on respiration of the addition of some intermediates of glucose oxidation and on the inhibition of respiration by HCN. The endogenous respiration rate increased after the addition of 2,4-dinitrophenol (DNP) or Na-azide but DNP inhibited the oxidation of glucose.

KALASHNIKOV (K.). Протравливание семян Кукурузы меркураном. [Maize seed treatment with mercurane.]—Совхозное Произ-Во. [*State Fm. Prod.*], **5**, pp. 68–69, 1956. [Abs. in *Referat. Zh. Biol.*, **15**, p. 188, 1957.]

At the Pushkin centre of the Institute for Protection of Plants (Leningrad region) in 1954–5 mercurane proved very effective for maize seed treatment, especially the combination containing 14% gamma-BHC and 2% ethyl mercury chloride. The treatment decreased the occurrence of [unspecified] diseases from 39·6 to 4–4·3% and stimulated growth, particularly of VIR-42, the green weight of which increased from 147·4 (untreated) to 293·4 c[entner]/ha. In the north, on all but black soils, the rate of application should be 150 g./c. seed.

OU (S. H.). **Diseases and insect pests of Rice in Taiwan and their control.**—*News Lett. int. Rice Comm.*, **6**, 3, pp. 19–26, 1957.

This survey [cf. **35**, p. 40] reviews the damage caused by and control of *Piricularia oryzae*, *Corticium sasakii* [**33**, p. 317], *Helminthosporium sigmoideum* var. *irregulare* [loc. cit.], *Cochliobolus miyabeanus*, and *Gibberella fujikuroi*. Most of the rice varieties that were resistant to *P. oryzae* in the north and central part of Taiwan became susceptible in the south, particularly Bai-ki-tou.

WANG (Y-H.), HSIA (L-C.), & WU (T-C.). **An investigation of Rice-blast fungus (Piricularia oryzae Cavara) in Yunnan province.**—*Acta phytopath. sinica*, **2**, 2, pp. 123–125, 1 fig., 1956. [Chinese. Abs. from English summary. Received 1957.]

High infection of rice seed by *Piricularia oryzae* was found in the province of Yunnan. The pathogen attacked chiefly the glumes and residual pedicels. It can survive more than 8 months' storage after harvest without losing vitality.

RANGASWAMI (G.) & SUBRAMANIAN (T. V.). **Estimation of loss due to blast disease of Rice.**—*Sci. & Cult.*, **23**, 4, pp. 192–193, 1957.

A summary is given of the results of experiments during 1950–54 at the Central Farm Wetlands, Coimbatore, India, on losses of grain, chaff, and straw caused by *Piricularia oryzae* [**36**, p. 663]. In a heavily infected field of susceptible Co.13 in 1950–1, where practically every plant and tiller was attacked, a comparison of the figures with those of bulk plots in years free from blast showed that when there is 60% neck infection and about 40% node infection the loss of grain yield is 75%.

In 1952–54 neck infection in the susceptible Adt.10, moderately resistant GEB.24, and resistant Co.25 reduced grain yield from 15·7, 10·7, and 14·8 oz., respectively, in 200 healthy heads to 4·4, 3·8, and 14·2 oz., respectively.

Node infection is also responsible for heavy losses in grain and straw yield, increasing chaffiness in the ear. In Co.25 neck infection apparently did not cause any appreciable loss.

PODHRADSZKY (J.). **Der Krankheitskomplex der Reisbräune in Ungarn.** [The Rice-browning disease complex in Hungary.]—*KongrBer. PflSchKongr., Berl., 1955*, pp. 183–196, 10 fig., 1955. [Received 1957.]

This paper comprises a description of the rice disease 'brusone' caused by *Pseudomonas oryzicola* and *Piricularia oryzae* in Hungary [cf. **34**, p. 813; **36**, p. 57], a review of contributory factors, and a note on resistant varieties (Precoce Alorio, Agostano, Nano di Vialone, and Line 45).

YAMAMOTO (W.), MAEDA (M.), & IDONO (T.). **Studies on the brown spot of Zizania latifolia Turcz. with special reference to comparison with the brown spot of Rice plants caused by Helminthosporium oryzae Breda de Haan.**—*Sci. Rep. Hyogo*

Univ. Agric., **2**, 2, pp. 11–16, 1956. [Japanese. Abs. from English summary. Received 1957.]

From field observations and inoculation experiments it is established that *Helminthosporium oryzae* [*Cochliobolus miyabeanus*] causes brown spot of *Zizania latifolia*, overwintering on it in ponds and ditches in western Japan, and forming a primary source of infection for rice plants in the spring.

Asada (Y.). **Studies on the susceptibility of akiochi (autumn-decline) Rice plant to Helminthosporium blight. I. Essential vitamins, minor elements, and suitable synthetic media of Cochliobolus miyabeanus. II. Toxicity of culture filtrate to Rice leaves and activities of pectic enzyme, cellulase, and xylanase of Cochliobolus miyabeanus.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 68–70, 1 graph; 4, pp. 191–193, 1 graph, 1956. [Japanese. Abs. from English summaries. Received Oct. 1957.]

At the Faculty of Agriculture, Ehime University, Japan, thiamine, Fe, Mn, and Zn were found to be essential for the culture of *Cochliobolus miyabeanus* in Richards's medium. The opt. pH and temperature for the activities of enzymes produced in the culture filtrate of the fungus were determined.

Tasugi (H.) & Ikeda (Y.). **Studies on the sheath rot of Rice plant caused by Acrocylindrium oryzae Sawada.**—*Bull. nat. Inst. agric. Sci. Tokyo*, Ser. C, *1956*, 6, pp. 151–166, 8 fig., 1956. [Japanese. Abs. from English summary. Received 1957.]

Sheath rot of rice caused by *A. oryzae* [**36**, p. 495], described from Formosa in 1922, is also prevalent in Japan. The rot chiefly attacks the uppermost leaf sheath; the greyish-brown lesions with brown margins coalesce to form large, irregular blotches. The rod-shaped hyaline conidia from the host measure $2{\cdot}1–8{\cdot}5 \times 0{\cdot}5–1{\cdot}6\,\mu$ and in culture $1{\cdot}8–13 \times 1–1{\cdot}6\,\mu$. The optimum conditions for growth are 20–28° C. and pH 6·4, and for germination 23–26° and pH 5·5–6·4. Growth is inhibited by treatment with 0·033% mercuric chloride for 15 min., 0·1–5% uspulun for 30 min., 0·2–5% copper sulphate for 24 hr., or 1–5% formalin for 5 min.

In inoculation experiments infection was facilitated by wounding the uppermost leaf sheath at the boot stage. The young ears were the most susceptible, grains and seedlings being only rarely infected. Incidence of sheath rot decreased with an increase in nitrogenous fertilizers.

Fang (C-T.), Liu (C-F.), & Chu (C-L.). **A preliminary study on the disease cycle of the bacterial leaf blight of Rice.**—*Acta phytopath. sinica*, **2**, 2, pp. 173–185, 1956. [Chinese. Abs. from English summary. Received 1957.]

Experiments at the Nanking College of Agriculture showed that inoculation of rice with *Xanthomonas oryzae* by placing the bacteria in the guttation water at the tip of the leaf was as effective under favourable conditions as spraying the entire leaf. The bacteria within the glume of the rice grain appeared to be the source of primary inoculum, seedlings grown from infected grain usually being diseased. Subsequent infection occurs in various ways via the stomata. In seed from heavily diseased fields the pathogen has been found not only in the glume but occasionally within the endosperm of the seed.

Iizuka (H.). **Studies on the microorganisms found in Thai Rice and Burma Rice. Part I. On the microflora of Thai Rice.**—*J. gen. appl. Microbiol.*, **3**, 2, pp. 146–161, 7 fig., 1 diag., 1 map, 1957.

A survey of the changing bacterial and mould flora of deteriorating stored rice in Bangkok.

Discover dread 'hoja blanca' disease in Florida Rice plots.—*Rice J.*, **60**, 11, p. 10, 1957.

Hoja blanca disease [? strain of rice stripe virus: **37**, p. 72] has been discovered on rice at Belle Glade Experiment Station, Florida, S.W. of Lake Okeechobee. A 40-acre field adjacent to the Station and volunteer rice some 5 miles W. of Belle Glade were also affected. Barnyard grass (*Echinochloa colonum* or *E. crus-galli*) and the weed *Panicum fasciculatum* also appeared to show evidence of the disease.

All infected areas were immediately sprayed with an insecticide, affected rice ploughed under, and infected grasses destroyed with chemicals.

In those parts of the world where the disease is endemic, about 4,000 varieties and strains of rice from the collection of the U.S. Dept Agric. have been grown. So far, some 285 lines of short- and medium-grain rice have displayed appreciable resistance, mostly introductions from Japan, China, and Taiwan.

Baba (I.), Takahashi (Y.), & Inada (K.). **Studies on the nutrition of the Rice plant with reference to the occurrence of the so-called 'akagare' disease. IV. Occurrence of the disease as influenced by the conditions of cultivation and its relationship with the metabolism of the plant.**—*Proc. Crop Sci. Soc. Japan*, **26**, 1, pp. 1–2, 1957. [Japanese. Abs. from English summary.]

In this further contribution from the National Institute of Agricultural Sciences [**36**, p. 270] it is reported that the incidence of rice akagare disease [see below] was high with heavy applications of nitrogen, deep irrigation water, and dense seeding, and low with dense planting per hill and midsummer drainage. The occurrence of the disease was positively correlated with a decrease in the starch content and an increase in soluble nitrogen, both probably caused by an increase in respiration and in peroxidase activity.

Yamaguchi (H.), Shiratori (K.), & Koizumi (A.). **Researches on the technical improvement of Rice culture on ill-drained fields. (1) Chemical characteristics of akagare paddy soils and classification of them with reference to the occurrence of the so-called 'akagare'. (2) Influence of the reductive condition of paddy soil on the occurrence of the 'akagare' disease. (3) Influence of the supply of hydrogen sulphide, butyric acid, and ferrous compounds by solution culture upon the plant growth.**—*Proc. Crop Sci. Soc. Japan*, **26**, 1, pp. 3–7, 6 graphs, 1957. [Japanese. Abs. from English summary.]

From a comparative study at the Chiba Agricultural Experiment Station of soil samples from 31 rice fields affected by 'akagare' disease [see above] and 17 normal fields it was found that factors contributing to the disorder were potassium deficiency, abundant humus in badly-drained soil, deficiency of ferric compounds and oxygen in surface soil, excess of ammonium nitrogen, and the presence of butyric acid, ferrous compounds, or hydrogen sulphide.

Plants grown in pots in which the soil was covered with olive oil at tillering to promote reducing conditions exhibited akagare symptoms and had a lower K_2O/N ratio than the untreated.

In culture solution akagare symptoms were induced in rice plants treated with hydrogen sulphide or butyric acid. Normal root activity was resumed 2–3 weeks after the removal of these substances from the culture solutions.

Tessi (J. L.). **Algunos parásitos que afectan a los cultivos de Sorgo.** [Some parasites which attack Sorghum crops.]—Abs. in *Idia*, **8**, Oct.–Dec., p. 35, 1956. [Received Dec. 1957.]

A report from the Instituto de Fitotecnía, Castelar, Argentina, states that the sorghum vars. Cody, Double Dwarf White Sooner S.A. 5155–36, Finney, and Milo S.A. 7114 have proved resistant to *Colletotrichum graminicola* (the only parasite

causing damage of economic importance) [**33**, p. 668], *Ramulispora sorghi*, *Gloeocercospora sorghi*, and *Physoderma* [*maydis*].

El-Helaly (A. F.) & Ibrahim (I. A.). **Host-parasite relationship of Sphacelotheca sorghi on Sorghum.**—*Phytopathology*, **47**, 10, pp. 620–623, 1957.

Studies at the University of Alexandria, Egypt, showed that infection of sorghum by *S. sorghi* [**19**, p. 13] occurs only between sowing and emergence of the seedling, this period being longest in March and April and progressively shorter until June or later, when least infection occurs, probably correlated with the high temperatures then [cf. **17**, p. 453]. Early in the season maximum infection occurs when seedlings are inoculated 4 days after sowing, later when they are inoculated on the same day as they are sown.

The vigour of smutted plants was reduced. The appearance of smutted secondary heads in apparently healthy plants from inoculated seed, when the healthy primary heads had been cut off, indicated the systemic nature of the fungus. The presence of healthy heads among smutted ones and healthy grains in some infected heads suggests that the shoot apex may outgrow the pathogen.

Safeeulla (K. M.) & Thirumalachar (M. J.). **Gametogenesis and oospore formation in Sclerospora species on Sorghum vulgare.**—*Mycologia*, **47**, 2, pp. 177–184, 19 fig., 1955.

A comparative study, carried out at the Central College, Bangalore, and at Malleswaram, Bangalore, India, showed that though the mature oospores of *Sclerospora andropogonis-sorghi* [*S. sorghi*] and *S. graminicola* are uninucleate, those of *Sclerophthora* [*Sclerospora*] *macrospora* [**32**, p. 631] are multinucleate, the fusion nucleus dividing immediately after formation.

In *S. graminicola* there are 8–16 nuclei in the mature antheridium, and 49–92 in the mature oogonium, as against 30–36 and 100–120 for *S. sorghi*. There is no clear demarcation between ooplasm and periplasm in *S. graminicola*, whereas it is well-defined in *S. sorghi*. The fusing nuclei are morphologically identical in *S. sorghi*, though in *S. graminicola* they are of slightly different sizes. The persistent wall of the oogonium is smooth and of uniform thickness in *S. graminicola*, but wavy in outline and of uneven thickness in *S. sorghi*. These differences justify the recognition of *S. sorghi* as a separate species. Gametogenesis and oospore formation in *S. macrospora* are intermediate between *Albugo* and *Sclerospora* and on cytological grounds its removal from the genus *Sclerospora* appears justifiable.

Knorr (L. C.), Suit (R. F.), & DuCharme (E. P.). **Handbook of Citrus diseases in Florida.**—*Bull. Fla agric. Exp. Sta.* 587, 157 pp., 83 fig. (10 col.), 1957.

This handbook describing the symptoms, cause, and control of each disease is based in part on previous bulletins [**31**, p. 181].

Salerno (M.). **Osservazioni biologico-sistematiche su Botryosphaeria ribis Gross. et Dugg., agente di un cancro gommoso degli Agrumi.** [Biological and systematic observations on *Botryosphaeria ribis* Gross. & Dugg., the cause of a gummy canker of Citrus.]—*Ann. Sper. agr.*, N.S., **11**, 3, pp. 741–774, 15 fig., 5 graphs, 1957. [English summary.]

A full account is given of the morphological and cultural characters and pathogenicity of *Botryosphaeria ribis* [cf. **12**, p. 283], isolated from lemon trees in Sicily. The morphology of the fungus in natural cankers on lemon trees is described, the perfect state being recorded for the first time in Sicily. Monoconidial or monoascospore cultures of all the isolates were made on rice; they fell into 4 colour groups, which are described. Ascigerous locules were formed early in spring, and the discharge of ascospores persisted throughout the summer.

Artificial inoculations demonstrated that lemon was the most susceptible species tested, followed in order of decreasing susceptibility by sour orange, tangerine, and sweet orange. The fungus affected the trunk and limbs more than the young twigs. The best time for successful inoculations appeared to be about the middle of spring.

KLOTZ (L. J.). **Protecting young trees against brown rot gummosis.**—*Calif. Citrogr.*, **42**, 2, p. 42, 1956.

In a brief note on practical control measures against brown rot gummosis of citrus [*Phytophthora* spp.: cf. **35**, p. 446] the author stresses the danger attending the increasing use of susceptible rootstocks to replace sour orange, on account of citrus tristeza virus. As a prophylactic measure against the introduction of infection with nursery trees the root systems may be disinfected by immersion in circulating hot water (110° F. for 6–10 min., 111° for 4–8 min., or 112° for 3–6 min.). As the stem bark is more susceptible than that of the roots, young trees should be planted with the upper lateral roots just covered by the soil, and as an additional precaution the lower 10 in. of stem bark should be painted with Bordeaux mixture shortly after planting. Bordeaux (1:1:100) or malachite green (10 p.p.m.) may be added to tank water for young trees (with agitation); frequent inspection with early excision of bark lesions is essential.

KLOTZ (L. J.), DEWOLFE (T. A.), & WONG (P.). **Guard against introducing brown rot fungi.**—*Calif. Citrogr.*, **42**, 7, p. 258, 1957.

Brown rot fungi [*Phytophthora* spp.: see above] present in the testas of seeds from infected citrus fruits infect the nursery seedbeds, and hence, on transplanting, spread to nursery rows. Balled trees from such nurseries constitute an important source of infection on clean land. On the basis of trials at the California Citrus Experiment Station with seed infected by *P. citrophthora* and *P. parasitica* the authors recommend hot water treatment (4 min. at 120–125° F.) for nursery seed.

ZACHOS (D. G.). **Une attaque sérieuse des Citronniers par le Septoria depressa McAlp.** [A serious attack on Lemon trees by *Septoria depressa* McAlp.]—*Ann. Inst. phytopath. Benaki*, **10**, 1–2, pp. 9–12, 2 fig., 1 graph, 1956. [Received 1957.]

A *Septoria* spot of citrus, a disease not hitherto recorded in Greece, has been observed on lemons in Peloponnesus, and is attributed to *S. depressa* [cf. **30**, p. 558]. The considerable damage in one area was probably influenced by a north wind and humid conditions with temperatures favouring the pathogen.

JOTANI (Y.). **On the scab of the 'kindzu' or 'golden bean' Orange plant.**—*J. Jap. Bot.*, **32**, 3, pp. 92–95, 2 fig., 1957. [Japanese. Abs. from English summary.]

A scab disease of *Fortunella hindsii* was first observed in Hamamatsu in 1941 on the younger leaves, petioles, twigs, and fruits. Inoculation tests established the causal pathogen to be *Sphaceloma* [*Elsinoe*] *fawcettii*.

ROISTACHER (C. N.), KLOTZ (L. J.), & EAKS (I. L.). **Blue-green mold on Citrus.**—*Calif. Agric.*, **11**, 10, pp. 11–13, 1 fig., 2 graphs, 1957.

From the University of California, Riverside, are reported studies of the use of ammonia gas in preventing blue-green mould (*Penicillium digitatum*) on oranges [**36**, p. 315, and below]. If the treatment is to be effective, the first application must be made within the first 24–30-hr. storage period (at 68° F.), after which the initial infection will have penetrated deeper than 1 mm. into the rind, beyond the reach of the gas; at 60 and 50° the periods are about 40 and 80 hr., respectively. Control of decay without injury is achieved at ammonia indexes (the area bounded by the curve and X-axis of a graph of the ammonium conc. round the fruit during and

after injection of the gas) of 500 to 3,000; the gas must be applied in quantities falling within this range after the high absorptive capacity of the cartons (up to 90%) has been accounted for. Good control is given by 100 p.p.m. ammonia in the atmosphere for 9–10 hr. The gas is most effective in a moist environment, spores falling on a fresh injury being readily killed. Dry spores are resistant, but become susceptible as the moisture increases. Repeated applications of gas are therefore believed to be more effective than single. Ethylene, for colouring, may be applied simultaneously with ammonia, neither being affected by the other.

MIDDLETON (J. T.). **Status of the University's Citrus decay control program.**—*Calif. Citrogr.*, **42**, 11, pp. 372, 380, 1957.

Of 1,700 substances screened for use against citrus decay, mostly blue-green mould [*Penicillium italicum* and *P. digitatum*], at the University of California Citrus Station, only ammonia [see above] was reasonably effective, acceptable to the Food and Drug Administration (FDA), free from retail market labelling, and without adverse effect on fruit flavour.

Although the FDA have laid down a tolerance permitting the further use of diphenyl [cf. **36**, p. 810] the search for a satisfactory substitute continues. In commercial shipment trials diphenyl was significantly superior to ammonia with lemons and slightly superior with oranges. The incidence of black buttons was greater with ammonia than with diphenyl or in controls. Crown-Zellerbach ammonia-impregnated paper inserts, while occasionally causing fruit injury, gave consistently better control of decay than Winn-Mat tablets; di-ammonium succinate tablets were also found to release ammonia earlier and in greater amounts than the latter. The comparative failure of ammonia preparations with lemons was attributed to a deficiency of water vapour in the boxes limiting the release of the gas.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **5**, 10, pp. 162–163, 1957.

Order No. 3619/SE of 10 Apr. 1957, published in *J. off. A.O.F.*, 2883, 20 Apr. 1957, prohibits the introduction into French West Africa of citrus plants and parts (except fresh fruit for consumption) from countries where tristeza virus is present. Consignments for scientific purposes are permitted to enter if certified to be free from tristeza.

REICHERT (I.) & BENTAL (A.). **Decline of Satsuma Mandarin Oranges in Israel.**—*F.A.O. Pl. Prot. Bull.*, **5**, 10, pp. 156–158, 2 fig., 1957.

Tests at the Agricultural Research Station, Rehovot, Israel, of 2 satsuma orange varieties (Owari and Wase) with symptoms of decline, on the Egyptian sour lime [*Citrus aurantifolia* var.] as the index plant [**36**, pp. 100, 526], showed that both were free from citrus tristeza virus. Both have also been ascertained to be tristeza-free in Texas [**34**, p. 91]. It is concluded that the decline of Owari and Wase in Israel is due to xyloporosis virus.

RODNEY (D. R.), HARDING (R. B.), BOSWELL (S. B.), & WHITING (F. L.). **Sodium in Lemon tree collapse.**—*Calif. Agric.*, **10**, 9, pp. 4, 10, 12, 1 graph, 1956.

The work here reported has already been noticed [**35**, p. 889].

CALAVAN (E. C.). **Wood pocket disease of Lemons and seedless Limes.**—*Calif. Citrogr.*, **42**, 7, pp. 265–268, 5 fig.; 8, pp. 300–304, 5 fig., 1957.

Wood pocket disease [**27**, p. 470] occurs in trees grown from buds or grafts from diseased sources, but does not appear to be transmissible to healthy trees and may prove to be an unstable chimaera. Seed transmission is common. Testing on indicator seedlings has definitely excluded the possibility that the disease is a form of

psorosis or tristeza, but rejection of the possibility of relationship with cachexia or xyloporosis is not yet justified; seed-transmitted pitting suggesting xyloporosis occurs in semi-dense Lisbon lemon seedlings as well as in occasional lemon seedlings from various other sources. The disease is generally worst in desert areas and less severe near the coast. A lime disease, discovered in Florida in 1943 and described as leaf blotch (*Proc. Fla hort. Soc.*, **56**, pp. 126–128, 1943), resembled the early descriptions of wood pocket in citrus. The lime disease has subsequently been observed on Bearss limes near Phoenix and at Mesa and Yuma in Arizona. The severest symptoms in commercial limes in California were recorded from an orchard of Bearss at Woodland Hills, Los Angeles, though most limes in California are free or nearly free from the disease. In Florida, however, a survey of 18 groves revealed symptoms in 31% of the bearing trees (*Proc. Fla hort. Soc.*, **63**, pp. 225–228, 1950).

Tarr (S. A. J.). **The host range of the Cotton leaf curl virus in the Sudan.**—*Emp. Cott. Gr. Rev.*, **34**, 4, pp. 258–262, 1957.

In further experiments on cotton leaf curl virus [cf. **36**, p. 526] 16 species of malvaceous plants [cf. **31**, p. 327] were experimentally infected by means of *Bemisia tabaci*. The evidence obtained indicated that in resistant species (resistance being taken as difficulty in inducing infection) the occasional plants that are infected develop characteristically mild and inconspicuous symptoms, and it is only with great difficulty that the virus can be transmitted from such plants. X1730A cotton (a strain of *Gossypium barbadense* resistant to but not immune from leaf curl virus in the Sudan Gezira), *Sida alba*, and *Senra incana* did not develop mosaic symptoms. There is little field evidence for the existence of symptomless carriers in the Sudan Gezira. Certain varieties of *G. hirsutum* did prove subject to infection, including Wild's No. 11, grown commercially at Zeidab in N. Sudan, most of the plants developing typical leaf mosaic. In all these transmission experiments, however, mosaic symptoms appeared only on certain varieties of *G. hirsutum*. Whether this is due to the existence of different strains of the virus or to the production of different symptoms on different host plants remains to be determined.

Symptoms of a virus disease distinct from typical mosaic and typical leaf curl sometimes appear on cotton in the Gezira. They appear to resemble the conditions described by Nowell [cf. **3**, p. 50] as 'loggerhead' and 'mottled hybrids' in Sea Island cotton (*G. barbadense*) in the W. Indies.

Rosberg (D. W.). **A new virus disease of Cotton in Texas.**—*Plant Dis. Reptr*, **41**, 9, pp. 726–729, 3 fig., 1957.

Virus-like symptoms on almost all the 5,000 Deltapine and Empire cotton plants in a screenhouse at Brownsville, Texas, included pronounced veinclearing of the older leaves with the development of chlorotic areas at the tips of the smaller veins, veinbanding, intervenal yellowing, and mottling. Young leaves first developed intervenal yellowing and downward curling and frequently exhibited typical mosaic symptoms and puckering. Both young and old leaves developed red spots between the veins and became tan- to buff-coloured, falling readily. Infected plants were stunted, with short terminal internodes; the bolls were $\frac{1}{2}$–$\frac{2}{3}$ normal size, with mottled bracts and poorly filled seeds. The virus was transmitted by grafting to healthy Empire plants but not, apparently, by seed. Similar symptoms were found on 6 other species of *Gossypium*, 6 races of *G. hirsutum*, 2 *G. hirsutum* crosses, and *Hibiscus esculentus*.

Spence (J. R.), Cave (C. T.), & Lake (E. B.). **West Indies. Cotton Experiment Stations. Progress Report for the season 1955–6.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (West Indies), 1955–6*, 15 pp., 1957.

Bacterial blight [*Xanthomonas malvacearum*: cf. **35**, p. 890] was severe in Antigua

on the young cotton crop, and incidence tended to be higher where attacks of *Prodenia ornithogalli* were greater. Black boll (*Phytophthora* sp.) [loc. cit.] caused severe losses in Montserrat.

HSU (J-S.) & CHIEN (T-H.). **Effect of various seed treatments on the control of Cotton seedling diseases.**—*Acta. phytopath. sinica*, **2**, 2, pp. 115–121, 1 pl., 1956. [Chinese. Abs. from English summary. Received 1957.]

At Nanking Agriculture College during 1953–55 two methods of hot water treatment used for the control of [unspecified] cotton seedling diseases, 55–60° C. for 30 min. and 74° for 30 min., both proved effective, particularly if followed by fungicidal treatment. Dusting with 0·5% ceresan or 0·2% granosan reduced diseased seedlings by 37–78% compared with the control, but 0·5% uspulun was not effective. Covering seeds at sowing with a mixture of cotton seed meal and field soil in which strains 6 and 28 of *Actinomyces* [*Streptomyces*] were cultured gave some 50% control of seedling diseases.

YIN (S-Y.), KENG (D-C.), YANG (K-Y.), & CHEN (D.). **A further study on the biological control of Verticillium wilt of Cotton.**—*Acta phytopath. sinica*, **3**, 1, pp. 55–61, 1957. [Chinese. Abs. from English summary.]

At the Liaoyang Cotton Experimental Station antagonistic actinomycetes cultured on cotton seed cake used as fertilizer stimulated the growth of cotton plants and decreased *Verticillium* wilt [**25**, p. 341]. Isolates G4 and 5406 gave the best results; 3 applications of the fertilizer containing them resulted in a decrease of 31–50% in the disease and an increase of 14–40% in yield. A 4th application was not economic. Slide burial tests showed that the actinomycete isolates survived longer at soil depths of 2·5–10 cm., but their amount was gradually reduced with time; they were most abundant at 5–7·5 cm.

LAKSHMANAN (M.) & VENKATA RAM (C. S.). **Influence of Fusarium culture filtrates on respiratory changes in Cotton.**—*Proc. Indian Acad. Sci.*, Sect. B., **46**, 2, pp. 131–137, 4 graphs, 1957.

Of culture filtrates from 21 *Fusarium* spp. [**37**, p. 23] examined at the University Botany Laboratory, Madras, 13 caused considerable increases of tissue respiration in cotton stem sections, 3 caused slight increases, and 4 were inhibitory [cf. **35**, p. 395]. Various organic acids, growth substances, amino acids, and vitamins in the filtrates stimulated respiration when tested individually.

WICKENS (G. M.). **Abyan root rot of Cotton.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp.* (*Aden*), *1956–7*, pp. 13–15, 1957.

A visit in Dec. 1956 to areas of the Abyan Scheme in the Aden Protectorate where cotton is affected by a wilt disease (Abyan root rot), the cause of which has not so far been definitely ascertained [cf. **35**, p. 525], indicated that the condition is characteristically a root rot. It occurs sporadically in roughly circular patches (up to 10 yd. diam. or more) in which all the plants are killed. The onset of the disease in individual plants is extremely rapid; on one day a plant may appear to be healthy and on the next all its leaves may be withered or dead. The disease tends to reappear in places where it was present the year before, with extensions. The symptoms and general behaviour of affected plants agree closely with the description of the cotton disease attributed to *Olpidiaster gossypii* [**33**, p. 672] and the one reported from the Punjab [**15**, p. 148]. A very similar malady was present in other crops grown in the Abyan Scheme: lubia (*Dolichos lablab*), pigeon pea, velvet beans [*Mucuna deeringiana*], simsim [sesame], mung beans [*Phaseolus mungo*], and castor [*Ricinus communis*] all showed similar symptoms in dead and dying patches, though the vivid yellow, red, or brown colour of the diseased tissues of cotton was generally lacking.

PULSIFER (H. G.). **Damping-off of Cotton seedlings caused by Colletotrichum hibisci Poll.**—*Iowa St. Coll. J. Sci.*, **32**, 1, pp. 57–61, 1957.

At the Agricultural Experiment Station, Ames, Iowa [cf. **36**, p. 698], isolates of *C. hibisci* from kenaf (*Hibiscus cannabinus*) caused a damping-off of cotton seedlings comparable with that caused by *C.* [*Glomerella*] *gossypii*, but spraying seedlings with conidial suspensions did not produce infection in the mature plants. The conditions of the experiment, however, were unfavourable to boll infection. One instance of limited infection of kenaf seedlings by an isolate of *G. gossypii* was observed.

WU (S-L.) & HSU (J-S.). **Control of Kenaf anthracnose.**—*Acta phytopath. sinica*, **2**, 2, pp. 127–139, 1956. [Chinese. Abs. from Russian summary. Received 1957.]

Kenaf [*Hibiscus cannabinus*] anthracnose (*Colletotrichum hibisci*) [see below] has spread devastatingly in the province of Lyonnin. The disease remains in the seeds and other parts of the plant and can survive up to 12 months in the field and 17 months in the laboratory. Heat treatment proved most effective for control. The seeds are left for 8 hr. in tepid water (15° C.), preferably with changes of the water, after which they are soaked in hot water (52°) for 10 min., or for 5 min. at 55°. Viability was not affected.

SIANG (W-N.), LEE (C-L.), KUO (S-G.), & CHENG (M-L.). **Experiments on the control of Kenaf anthracnose caused by Colletotrichum hibisci Pollacci.**—*Acta phytopath. sinica*, **2**, 2, pp. 141–152, 1956. [Chinese. Abs. from English summary. Received 1957.]

At the Peking Institute of Agriculture complete control of *C. hibisci* on kenaf (*Hibiscus cannabinus*) [see above] was obtained by treating the seeds at 50° C. for 15–20 min. after presoaking at 20° for 24 hr. Steeping in an aqueous solution of 0·5% uspulun at 24–26° for 24 hr. gave very promising results. An aqueous extract (1–2%) of dried garlic powder at 24–26° for 24 hr. also checked the disease, but germination was reduced.

The fungus in host debris in Peking and other localities in N. China was found to be no longer viable in most cases after 2 winters. At crop time phenyl mercury acetate plus hydrated lime (1:19) applied as dust after rain gave better control than Bordeaux mixture.

WHITESIDE (J. O.). **Further studies on the stem-break disease of Sunn Hemp.**—*Rhod. agric. J.*, **54**, 4, pp. 327–331, 1957.

In further studies on stem break (*Colletotrichum curvatum*) of *Crotalaria juncea* in Southern Rhodesia [**35**, p. 677] all other species of *Crotalaria* remained completely resistant to all isolates of the fungus tested by field inoculation. Further evidence of seed transmission was obtained. *Colletotrichum curvatum* was not found in the soil near diseased sunn hemp trash buried 21 months earlier, though a trace of infection was still present in partially decomposed stalks left lying on the soil surface during the same period. It is advisable to wait at least three years before re-sowing sunn hemp on infested land.

SABET (K. A.). **Studies in the bacterial diseases of Sudan crops. I. Bacterial leaf spot of Jute (Corchorus olitorius L.).**—*Ann. appl. Biol.*, **45**, 3, pp. 516–520, 1 pl., 1957.

Studies at the University of Khartoum, Republic of the Sudan, on a bacterial leaf spot of *C. olitorius*, characterized by brown, circular spots 2–5 mm. diam. on the leaves, sometimes surrounded by a yellow halo, elongated lesions on the stems, and small spots on the capsules, showed it to be due to a new variety of *Xanthomonas nakatae*, the cause of a similar disease of *C. capsularis* in Taiwan. There are minor

differences in biochemical characters, the Sudan pathogen does not infect *C. capsularis*, and *X. nakatae* has not been reported as attacking *C. olitorius*. The name *X. nakatae* var. *olitorii* is suggested.

GAGNOTTO (ANNA V.). **Le malattie delle piante ornamentali osservate in Italia. Parte II. Angiospermae Monocotyledoneae.** [The diseases of ornamental plants observed in Italy. Part II. Angiosperms Monocotyledons.]

FABRICATORE (JOLANDA A.). **Dicotyledoneae. Parte seconda. Parte terza.** [Dicotyledons. Part two. Part three.]—*Ann. Sper. agr.*, N.S., **11**, 3, *Suppl.*, pp. i–lxvi, lxvii–ciii; 4, *Suppl.*, pp. i–xxx, 1957. [English summaries.]

These are further bibliographical reviews listing the disorders of Monocotyledons, and of 17 and 18 families of Dicotyledons (Celastraceae to Lauraceae and Leguminosae to Ranunculaceae) [cf. **36**, p. 637].

YAMAMOTO (W.), MAEDA (M.), & OYASU (N.). **Studies on the Penicillium diseases occurring on cultivated plants. I.**—*Sci. Rep. Hyogo Univ. Agric.*, **2**, 2, pp. 23–28, 1956. [Japanese. Abs. from English summary. Received 1957.]

P. corymbiferum and *P. cyclopium* were identified as the green and blue moulds, respectively, of tulip bulbs, *P. gladioli* as a blue mould of gladiolus corms, and *P. expansum* as a blue mould of sweet potato rhizomes. A new species (similar to *P. thomii*), causing blue mould of *Crocus sativus* and named *P. crocicola* Yamamoto, is described.

HOLLINGS (M.) & KASSANIS (B.). **The cure of Chrysanthemums from some virus diseases by heat.**—*J.R. hort. Soc.*, **82**, 8, pp. 339–342, 1 col. pl., 1957.

At the Plant Pathology Laboratory and Rothamsted Experimental Station, Harpenden, potted chrysanthemum plants of Market Gold, Pearl Sweetheart, and Purple Prince infected by [tomato] aspermy [**35**, p. 299; **36**, p. 700] and vein mottle viruses, the last also by an unidentified virus, Pink Valet by vein mottle and virus d, Roseverne by virus b [loc. cit.], and Roseverne by [chrysanthemum] stunt and ring pattern viruses were maintained in an incubator at 97° F. for 3–4 weeks. Cuttings taken after treatment were free from aspermy, stunt, and ring-pattern but not from the other viruses [cf. **36**, p. 749].

RAABE (R. O.). **Perithecia of Erysiphe polygoni on Iceland Poppy.**—*Plant Dis. Reptr*, **41**, 8, pp. 694–695, 2 fig., 1957.

In 1956 *Papaver nudicaule* at the University of California, Berkeley, was heavily infected by *E. polygoni*.

TSUKAMOTO (E.) & HINO (T.). **On the twig blight of the Tree Peony and its causal fungus Pestalotia paeoniicola sp. nov.**—*Ann. phytopath. Soc. Japan*, **21**, 4, pp. 181–184, 3 fig., 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

A description is given of a severe twig blight of tree peony (*Paeonia suffruticosa*) caused by *Pestalotia paeoniicola* Tsukamoto & Hino, first collected at Akita City, Japan, in March 1952. The first symptoms are minute blackish dots on the bark of living branches which turn grey and eventually die. The 4-septate conidia are $17–36 \times 6–9\,\mu$. The cultural characteristics of the pathogen are listed.

BRIERLEY (P.) & LORENTZ (P.). **Wisteria mosaic and Peony leaf curl, two diseases of ornamental plants caused by viruses transmissible by grafting but not by sap inoculation.**—*Plant Dis. Reptr*, **41**, 8, pp. 691–693, 2 fig., 1957.

New leaves of *Wisteria* plants (probably *W. floribunda* var. *rosea*) from a Michigan

nursery developed yellowish blotches with scattered green islands, and mature ones lateral twisting of the leaflets. A virus was transmitted by grafting to *W. sinensis* and *W. floribunda* but not by sap inoculation.

At Brookeville, Maryland, a leaf curl virus of Mme. de Verneville peonies under glass caused dwarfing of the plants to half the normal height and the development of crooked flower stalks and curled leaves. In the second season of infection the plants were more dwarfed, with thin, weak shoots and no flowers. The virus was transmitted by grafting to peony, but not by leaf rubbing, by contamination of the cutting knife, or by the fresh-leaf method [**33**, p. 203].

HOCKEY (J. F.). **Further observations of flat limb of Gravenstein.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 3, pp. 259–261, 1957.

The virus nature of apple flat limb [**22**, p. 438] on the variety Gravenstein was confirmed in grafting experiments at Kentville, Nova Scotia. The stocks Anis and Antonovka were less susceptible than French Crab. Stem-grafted trees were more susceptible to the disease than those which had been root-grafted or budded.

Further note on surfactants in concentrate mixture for control of Apple scab.—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 1, pp. 82–83, 1957.

In further trials in British Columbia on the effect of surfactants on concentrate spray mixtures for the control of apple scab [*Venturia inaequalis*: **35**, p. 776] 1 quart triton B-1956/100 gal. added to 4 lime-sulphur pre-cover sprays, to the 1st and 2nd cover sprays of ferbam and wettable sulphur, and to ziram in the 3rd cover spray improved control at both the 50- and the 75-gal./acre rates, reducing fruit infection in one orchard from 100% (untreated) to 37·3 and 26·2%, respectively, the corresponding figures without triton B-1956 being 61·4 and 42·5%. The higher volume was superior, but the lower with the surfactant was as effective as the higher without it. In another orchard the figures were: 100% (no treatment), 47·4% for 50 gal. without triton-B, 15% with, and 18·5% for 75 gal. without triton-B, no results being available for the 5th test.

JULIEN (J. B.) & SPANGELO (L. P. S.). **Physiological races of Venturia inaequalis.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 2, pp. 102–107, 1957.

In studies carried out jointly by the Botany and Plant Pathology Division, Science Service, and the Horticulture Division, Experimental Farms Service, Ottawa, isolates of *Venturia inaequalis* from infected apple leaves and fruits [**36**, p. 192], received from various parts of Canada and cultured and transferred in identical conditions, differed in sporulation ability and growth rate. Variations in the shape, size, and colour of the colonies and in their pathogenicity to different varieties and seedlings were observed among monoconidial isolates obtained from tissue isolates. It is suggested, therefore, that distinct physiological races of the fungus were present.

MEIJNEKE (C. A. R.). **The radio warning service for Apple and Pear scab in the Netherlands.**—*Netherlands J. agric. Sci.*, **5**, 4, pp. 263–270, 6 fig., 1 map, 1957.

The methods used by the Plantenziektenkundige Dienst, Wageningen, in forecasting possible outbreaks of apple and pear scab (*Venturia inaequalis* and *V. pirina*) in the Netherlands [cf. **35**, p. 302] are described. The work is done in collaboration with the Royal Dutch Meteorological Institute, the Horticultural Extension Service, and several private fruit growers. The warnings are of particular importance to growers using the recently developed curative organic mercurials, which are applied after infection but before the incubation period is over.

The methods of Mills and La Plante [**35**, p. 301] have been adopted.

Osterwalder (A.). **Vom Jonathan Spot.** [Jonathan spot.]—*Schweiz. Z. Obst- u. Weinb.*, **66**, 19, pp. 444–447, 2 fig., 1957.

At the Eidgenössische Versuchsanstalt, Wädenswil, *Gloeosporium album* was isolated from 'Jonathan' spots and produced identical spots on healthy apples at the site of small needle wounds on the skin. Spots did not develop where the skin was uninjured. The author refers to similar earlier work incriminating another fungus, subsequently identified as *Plectodiscella* [*Elsinoe*] *pini* [**8**, p. 469].

Groom (R. W.) & Hall (J. C.). **Perennial canker of Pear.**—*Plant Path.*, **6**, 3, p. 95, 1 pl., 1957.

Conference pears infected by *Gloeosporium* [*Neofabraea*] *perennans* were received from 3 orchards in Essex, 1 in Worcestershire, and 1 near Wisbech, Cambridgeshire. The identity and pathogenicity of the fungus were confirmed by cross-inoculations to Cox's Orange Pippin apples. *N. perennans* showed no specificity for apple or pear fruits. The fungus was also isolated from wood of a pear orchard in Kent, where fruit was unobtainable. This is believed to be the first record of *N. perennans* on pear wood and fruit in England [cf. **36**, p. 329].

Vukovits (G.). **Große Schäden an Steinobst durch Pilze der Gattung Taphrina.** [Heavy damage to stone fruit by fungi of the genus *Taphrina.*]—*Pflanzenarzt*, **10**, 9, pp. 83–85, 4 fig., 1957.

In a brief note from the Bundesanstalt für Pflanzenschutz, Vienna, the author compares the life history of *T. deformans* on peach with that of *T. pruni* on damson and *T. minor* on cherry. *T. pruni* is stated to be causing heavy damage in some areas, particularly in Styria.

Jensen (D. D.). **Differential transmission of Peach yellow leaf roll virus to Peach and Celery by the leafhopper, Colladonus montanus.**—*Phytopathology*, **47**, 10, pp. 575–578, 1957.

At the University of California, Berkeley, it was shown that *C. montanus* is a very inefficient vector of peach yellow leaf roll virus [strain of peach western X disease virus: **33**, p. 433; p. **36**, 106]. From peach to peach, only 1 of 168 trees became infected. With celery as source and test plant, 232 out of 546 plants became infected. Fed for 1 day (in most cases), 15 proven viruliferous leafhoppers transmitted the virus to 43 of 123 celery plants. After acquiring virus from celery, 38 groups of 4–10 leafhoppers fed alternately on peach and celery for 24-hr. periods transmitted the virus to 57 of 213 celery plants but only to 4 of 238 peach trees. Although numerically dominant to *C. germinatus*, *C. montanus* is considered to be of less economic importance.

Chamberlain (E. E.), Atkinson (J. D.), & Hunter (J. A.). **Occurrence of Peach calico in New Zealand.**—*N.Z. J. Sci. Tech.*, Sect. A, **38**, 8, pp. 813–819, 4 fig., 1957.

A virus observed in Jan. 1948 on a Goldmine nectarine in Central Otago appears to be identical with peach calico of the U.S.A. [**36**, p. 534]. It has since been found on some 50–60 trees of 10 peach varieties; although widely distributed throughout New Zealand few affected trees occur in any one district.

Cochran (L. C.) & Calavan (E. C.). **Apricot ring pox virus not transmitted through Apricot seeds.**—*Plant Dis. Reptr.*, **41**, 8, p. 690, 1957.

No symptoms of apricot ring pox virus developed on seedlings of Wenatchee Moorpark apricot grown from seed from infected trees at Hemet, California, and the virus was not detected in them by indexing [cf. **26**, p. 19; **28**, p. 339; **30**, p. 277].

Scaramuzzi (G.) & Paradies (Maria). **L'alternariosi delle foglie di Mandorlo.** [Alternariosis of Almond leaves.]—*Ann. Sper. agr.*, N.S., **11**, 3, *Suppl.* pp. cv–cxvi, 1 pl., 5 fig., 1957. [English summary.]

A full account is given of the authors' study of a leaf blotch of Rachele, Fra Givlio, and Catuccia almonds observed in the Botanical Garden of the University of Pavia in Sept. 1954, which they attribute to *Alternaria tenuis*. Artificial inoculations of almond, peach, and apricot leaves gave positive results only under conditions of very high atmospheric humidity. The disease is of little or no importance.

Posnette (A. F.) & Cropley (R.). **A canker disease of Cherry trees caused by virus infection.**—*Plant Path.*, **6**, 3, pp. 85–87, 2 pl. (between pp. 94–95), 1957.

Frogmore sweet cherry trees in an orchard in Herefordshire developed a cankered condition in which the bark was rough and fissured, the branches appeared to be knotted at most nodes, and many fruit spurs were dead. No pathogenic bacteria were present. Frogmore trees grafted with infected material developed drooping leaves with large, purplish-red, necrotic spots, usually only 2 or 3/leaf, unaccompanied by mottling. These spots recurred for 4 years in succession on leaves formed in spring and in late summer, which were shed several weeks before healthy ones. As necrosis progressed between the nodes the surface of branches 3 years old or more became affected and most of the buds and fruit spurs were killed. The name 'Frogmore virus canker' is provisionally suggested for the condition.

Taylor (R. E.) & Schofield (Elizabeth R.). **Observations on the control of American Gooseberry mildew.**—*Plant Path.*, **6**, 3, pp. 88–90, 1957.

In 1955 a spraying trial against *Sphaerotheca mors-uvae* [cf. **31**, p. 246] was conducted on a commercial plantation in Worcestershire, in which Leveller gooseberries were treated with the following (rates/100 gal. water): (A) dinitrocaprylphenyl crotonate, 1 lb. of a 25% wettable powder+6 fl. oz. of a proprietary wetting agent; (B) washing soda 20 lb.+soft soap 10 lb.; (C) washing soda 20 lb.+6 fl. oz. of the wetting agent; and (D) a proprietary product containing 42·5% manganese dimethyldithiocarbamate, $1\frac{1}{4}$ pints; (E) was unsprayed. The sprays were applied on 19 May, when the fruit had just set, and again on 10 June at the rate of 25 gal./plot of about 140 bushes. Assessments of mildew (on 1,000 berries/plot) made on 13–14 July gave 0·3, 2·2, and 8·4% infection for treatments A, B, and D, respectively.

In 1956 Keepsake gooseberries were given treatments A, B, and C on 3 and 26 May at 6–8 gal./28 bushes. The whole area had been sprayed with washing soda and wetter on 9 Apr., just before flowering. On 2 July mildew assessments were 0, 1, and 1·3%, respectively, compared with 1·6% on E.

Stace-Smith (R.) & Mellor (Frances C.). **Studies on Rubus virus diseases in British Columbia. IV. Transmission of Raspberry mosaic viruses to Fragaria vesca L.**—*Canad. J. Bot.*, **35**, 3, pp. 287–290, 1 pl., 1957.

In continuation of this series [**36**, p. 198] the *Rubus* yellow net virus component of red raspberry mosaic was transmitted by leaf grafting from Cuthbert raspberry to three strains of *F. vesca*. This constitutes the first record of the transmission of a mosaic-type raspberry virus to a genus other than *Rubus*. Neither the raspberry aphid, *Amphorophora rubi*, nor the strawberry aphid, *Pentatrichopus fragaefolii*, transmitted the virus from raspberry to *F. vesca* although it was transmitted from *F. vesca* back to raspberry by *A. rubi*. The other component of raspberry mosaic, black raspberry necrosis virus, was not transmitted to strawberry by these methods.

Rorie (F. G.). **Resolution of certain Strawberry viruses by the aphid vector Capitophorus minor Forbes.**—*Plant Dis. Reptr*, **41**, 8, pp. 683–689, 5 fig., 1957.

At the University of Arkansas, Fayetteville, non-persistent virus components of the

complexes common to strawberry plants in the State were transmitted from Blakemore to *Fragaria vesca* indicator plants by *C. minor*. Isolate I, a mild mottle virus [**37**, p. 97], was acquired in 1 hr. but not in 30 min., and persisted in the aphid for 2–3 hr. Isolate II, with similar vector relationships, produced more severe symptoms on all the 4 sources of *F. vesca* used. When an MEM (East Malling) plant infected by the complex containing isolate I was kept for 14 days at 36–47° C. isolate I was eliminated, the remainder of the complex producing symptoms similar to those of type 2 (Demaree & Marcus) or C (McGrew) [str. of strawberry latent virus: **36**, p. 39]. Isolates I and II are tentatively considered to be strains of the same virus, though not closely related, as there was no cross-protection. Symptoms were similar to those of Frazier's strawberry latent virus [**33**, p. 306], virus 1 of Prentice & Harris [**25**, p. 459], and the non-persistent virus of Mellor & Fitzpatrick [**31**, p. 499]. The severe reaction of the MEM plants indicates that they may carry a latent virus [cf. **37**, p. 132].

TAPER (C. D.), COLLINS (W. B.), MURRAY (H. R.), & KENNEDY (J. E.). **Magnesium, calcium, and boron nutrition of the Strawberry in relation to black root disease.** —*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 2, pp. 167–173, 1957.

At McGill University, Quebec, the effects of all possible combinations of three concentrations of Mg, Ca, and B on Senator Dunlap strawberries growing in sand culture were studied by means of spectographic analysis. An increase in Mg in the solution increased its accumulation in the plants but decreased that of Ca. An increase in B supply also induced its accumulation but at the same time fruit yield was decreased. All plants given 0·5 p.p.m. B developed marginal chlorosis of the leaves, typical of B toxicity, and gradually extending necrotic areas on the crowns and roots, characteristic of strawberry black root disease [cf. **31**, p. 561], indicating that these symptoms were also symptomatic of B toxicity. These results confirm the low B requirement of the strawberry.

ALLEN (R. M.). **A virus-type disease of Gros Michel Bananas in Costa Rica.**—*Turrialba*, **7**, 3, pp. 72–83, 10 fig., 1957. [Spanish summary.]

In an estate near Roxana, Costa Rica, a number of virus-like symptoms were observed on Gros Michel bananas in May 1956. This is the first record of a virus or virus-like disease on cultivated bananas in Central America. Symptoms include rosetting of the crown; the leaves are malformed, with chlorotic mottling and streaks, and are reduced in size and number. Both surfaces of the sheaths are streaked and blotched with water-soaked, yellowish-brown or greyish-green areas. The flower stalks remain horizontal and the pulp of immature fruit is yellow, turning brown near the seed. The root systems are reduced and infested with nematodes. Many of these characteristics are similar to those of a number of other virus diseases of Musaceae, the symptoms of which are tabulated. Roxana disease most closely resembles banana bunchy top.

From preliminary experiments Roxana disease appears to be systemic. It has probably been spread to new areas by the use of diseased seed-pieces. Transmission tests to confirm the virus nature of the disease are in progress.

RISHBETH (J.) & NAYLOR (A. G.). **Fusarium wilt of Bananas in Jamaica. III. Attempted control.**—*Ann. Bot., Lond.*, N.S., **21**, 84, pp. 599–609, 1957. [18 refs.]

In studies on the control of Panama disease (*F. oxysporum* f. *cubense*) [**36**, p. 477] of Gros Michel bananas, eradication and quarantine seldom achieved more than temporary success. At the Banana Breeding Station, Bodles, where Gros Michel was grown on land not before planted with bananas, wilt cases were given the '9-root' treatment, in which the affected plant and 8 surrounding it were destroyed and an isolation trench dug. In places where wilt was occurring regularly, plants immedi-

ately outside the trenches developed the disease within 6–8 months, or about as soon as they would have done without treatment. Later, removal was confined to diseased plants ('1-root'), but again wilt often affected adjacent plants within a few months, and the situation was not improved when corrugated metal sheeting was placed in the trench to provide a continuous barrier round the infection site.

Soil fumigation was unpromising and flood fallowing is impracticable, level land being scarce in the West Indies and often very freely draining. Supplements of organic materials, such as green manures, compost, and bagasse were also ineffective.

As Lacatan can be grown free from wilt on a wide range of soils there seems little point in pursuing these investigations on Gros Michel. A more promising field for research might concern the conditions necessary to keep existing healthy Gros Michel plantations free from wilt. Prevention or limitation of the disease in resistant varieties depends on a proper selection of site, the maintenance of soil structure and fertility, and balanced fertilizing; promising varieties should be tested on a range of soil types, including those known to favour wilt.

Chakravarty (Tilottama). **Anthracnose of Banana (Gloeosporium musarum Cke & Massee) with special reference to latent infection in storage.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 337–345, 1 pl., 3 fig., 1957.

At the Dept of Cryptogamic Botany, University of Manchester, isolates of *Gloeosporium musarum* [**35**, p. 905; **36**, p. 255 *et passim*] from Cavendish bananas from the Canary Isles and Gros Michel bananas from the Cameroons and Jamaica were found to be comparable or only slightly different. In studying latent infection it was found that the germination of conidia was inhibited by a substance, possibly tannin, present in green bananas, but not in ripe ones. In inoculation experiments *G. musarum* penetrated the banana cuticle by mechanical means but in green fruit remained inactive in the subcuticular region until the fruit ripened, when the fungus became active and produced typical anthracnose lesions.

Durbin (R. D.), Frolich (E. F.), & Zentmyer (G. A.). **Hot-water treatment of Avocado seed for the eradication of Phytophthora cinnamomi.**—*Plant Dis. Reptr*, **41**, 8, pp. 678–680, 1957.

At the University of California, Los Angeles, and the Citrus Experiment Station, Riverside, treatment of avocado pear seed (inoculated by inserting a piece of mycelium into one cotyledon) in water at 120–125° F. for 30 min. eliminated infection by *P. cinnamomi* [**36**, p. 335] without impairing germination, whereas all the inoculated, untreated seeds carried the fungus.

Mezzetti (A.). **'Defogliazione' o 'giallume latente' del Kaki, con particolare riguardo alla sua epidemiologia. Terzo contributo.** ['Leaf fall' or 'latent yellows' of Persimmon, with special reference to its epidemiology. Third contribution.]—*Ann. Sper. agr.*, N.S., **11**, 4, pp. 958–977, 3 pl., 7 fig., 1957. [English summary. 14 refs.]

Further studies on leaf fall of persimmon in Italy [**36**, p. 335] showed that vein necrosis (the basic symptom) [**27**, p. 327] was present in at least one growing season and to some extent on almost every tree in several orchards in the Romagna district during 1951–54. The disease is as a rule only malignant in trees under unfavourable conditions, when it leads to extreme weakness accompanied by intense chlorosis and die-back. If the unfavourable growing conditions are corrected, the disease assumes a non-malignant form. The development of slight symptoms appears to accompany such unfavourable localized conditions as insect damage or chemical scorching of leaves with vein necrosis.

Diseased scions grafted on to healthy plants generally recover, except for

occasional symptoms on the foliage of the stock, which are usually mild, but may be more severe in unfavourable growing conditions. Branches girdled with wire to compress the bark developed streak on the leaves above the constriction. Transient chlorosis and streak appeared on a few seedlings grown from fruits of persimmon of the *Lycopersicon* type.

It is considered that the symptoms indicate either a physiological disturbance of the plants or a latent virus present in all persimmon plants of the *Lycopersicon* type grown in Italy. The latter view seems much the more probable, and the name 'latent yellows' is suggested for the condition.

Shumilenko (E. P.). Влияние источников углеродного питания на морфологические и паразитические свойства возбудителя болезни всходов Клевера **Alternaria tenuis Nees.** [Influence of carbon nutrition on morphological and parasitic properties of the agent of Clover sprouts disease *Alternaria tenuis* Nees.]—Микробиология [*Microbiology*], **26**, 3, pp. 374–379, 7 fig., 1957. [English summary.]

At the Ural section of the Biological Institute of U.S.S.R. the growth in culture of *A. tenuis*, isolated from diseased clover shoots, was influenced by the carbon source, particularly the shape, size, and colouring of the spores and hyphae, fermentative activity, and virulence to clover. The carbon compounds were responsible for intensive production of conidia and pigment, the former being very profuse in a sucrose medium. Glucose induced greater virulence.

Isaac (I.). **Wilt of Lucerne caused by species of Verticillium.**—*Ann. appl. Biol.*, **45**, 3, pp. 550–558, 1 pl., 1957.

During 1954–56 many wilted lucerne plants were received from various places in England and from 1 in Wales. In plants from 28 of the localities the causal organism was *V. albo-atrum* [cf. **32**, p. 629; **36**, p. 530], while plants from 1 site, Cambridge, yielded *V. dahliae*, and only a few were infected. The strains on lucerne appear to be distinct from those on other crops. Outbreaks have been observed in Shropshire, Berkshire, Sussex, Surrey, Kent, E. Anglia, and western Wales. The symptoms resemble those on sainfoin infected by *V. dahliae* [**25**, p. 504]. During the summers and autumns severity in all infected areas was very uniform. In certain fields over 50% of the plants were affected. In 1st-year crops the wilt usually appeared in isolated patches of one or a few plants, but in 2nd- and 3rd-year crops it occurred in large, irregular areas or in 2–3-acre longitudinal strips parallel to the rows. By the end of the 3rd year the infected crops were worthless as fodder. The affected strains included Ile de France, English Grimm, Canadian Grimm, Chartrainvilliers, Provence, Eynsford, and Du Puits.

It was found that both pathogens form conidia superficially on the basal parts of infected stems. *V. albo-atrum* is introduced into a new locality in contaminated plant material harvested with the seed from an infected crop. Rapid secondary spread follows the dispersal of spores from infected stems and the contact of these spores and transported fragments of diseased tissues with the wounded surfaces of lucerne plants, which may be cut 3 or 4 times in a growing season. Seed should be collected only from healthy crops, cut if possible before infected ones, and machinery, boots, etc., should be disinfected before a diseased site is left.

In manurial trials the incidence of *V. albo-atrum* wilt was very high under all soil conditions tested, though *V. dahliae* proved virulent only to plants growing in soil rich in superphosphate. In general, the more vigorous the growth of the lucerne, the more rapid the onset of the disease and its secondary spread.

Pfeiferová (Jiřina) & Kvíčala (B. A.). **Anthraknosa Vojtěšky způsobená houbou Colletotrichum trifolii Bain. a Essary — nová choroba Vojtěšky u nás.** [Lucerne

anthracnose caused by *Colletotrichum trifolii* Bain. et Essary—a new Lucerne disease.]—*Preslia*, **29**, 4, pp. 384–390, 4 fig., 1957. [Russian and English summaries.]

Anthracnose (*Colletotrichum trifolii*) [cf. **30**, p. 232; **36**, p. 531] is widespread in Czechoslovakia on lucerne and also on clovers (particularly red clover), *Melilotus*, *Ornithopus*, and annual leguminous weeds, and was artificially transmitted to other legumes. It is suspected that the fungus was introduced during the German occupation as it was widespread in Germany at that time. It is particularly damaging to young shoots. The disease was first observed in the region of Pišt in 1948 where it was widespread in 1957, in Brno in 1950, 1955, and 1957, and in Pohořelicich in 1955.

Talboys (P. W.). **The possible significance of toxic metabolites of Verticillium albo-atrum in the development of Hop wilt symptoms.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 415–427, 1 pl., 1 fig., 6 graphs, 1957. [34 refs.]

Following an introductory review of various opinions on the mechanism of vascular wilts, further studies on hop wilt (*V. albo-atrum*) at East Malling Research Station [**35**, p. 927; **37**, p. 51] are described. The intensity of the toxin-induced syndrome in hop shoots placed in culture filtrates of *V. albo-atrum* was not related either to the pathogenicity of the fungus strain or to the wilt tolerance of the hop variety. It was apparent that water uptake is the factor most relevant to symptom development, but that the proportion of vessels rendered useless by vascular obstruction was insignificant as a contributory factor to water shortage, which probably occurs in the small, terminal elements of the vascular system of the leaf. It is considered that in an early, determinative phase of the disease the interactions of the mechanisms governing the pathogenicity of the fungus and the tolerance of the host lead to the production of different intensities of vascular invasion in the roots, while in the secondary, expressive phase continued but sometimes restricted fungal action causes visible symptoms, the intensity of which may depend on the amount of toxin present and the quantity of mycelium in the vascular system.

Matsushima (T.), Ito (H.), & Ikeda (M.). **Investigation on the fungal spoilage of crude drugs. I.**—*J. Jap. Bot.*, **32**, 7, pp. 201–207, 1957.

At the Division of Medicinal Plant Garden, National Hygienic Laboratory, Setagaya, Tokyo, the principal moulds growing on various dried parts of drug plants during storage at 25° C. and R.H. 100% were *Aspergillus wentii* on subterranean stems of *Coptis japonica*; *A. sydowi* on roots of *Polygala tenuifolia*; *Penicillium wortmanii* on subterranean stems of *Anemarrhena asphodeloides*; *Scopulariopsis brevicaulis* and var. *glabrum* and *Rhizopus nigricans* [*R. stolonifer*] on roots of *Astragalus* spp. and *Angelica glabra*; *S. brevicaulis* and *var. glabrum*, *Aspergillus ruber*, and *A. repens* on roots of *Angelica polyclada*; *S. brevicaulis* and var. *glabrum* on seeds of *Foeniculum vulgare*; *Aspergillus versicolor* on subterranean stems of *Panax japonicus*; and *Penicillium variabile* on roots and subterranean stems of *Glycyrrhiza uralensis*. At lower R.H. (75·4 and 84·3%) sometimes a different species predominated and fungal growth was poorer.

Abe (T.) & Yeh (C.-T.). **A new dry rot disease of fruit of Aleurites fordii Hemsel caused by Phomopsis sp.** –*Sci. Rep. Fac. Agric. Saikyo Univ.* 8, pp. 89–96, 2 fig., 1956. [Japanese. Abs. from English summary. Received 1957.]

A description is given of a dry rot of tung (*Aleurites fordii*) fruits caused by *Phomopsis* sp. The opt. temp. for growth of the pathogen in culture was 28° C. and the thermal death point 46–51° for 10 min. Pycnidial formation occurred after 20–25 days and was accelerated by ultra-violet radiation; the size of pycnidia produced under these conditions was smaller than normal.

THEIS (T.) & JIMÉNEZ (F. A.). **A Vanilla hybrid resistant to Fusarium root rot.**—*Phytopathology*, **47**, 10, pp. 579–581, 3 fig., 1957.

In order to control *F. batatis* var. *vanillae* on vanilla [cf. **33**, p. 590] in Puerto Rico the susceptible *V. planifolia* was crossed with the resistant *V. phaeantha* by the U.S. Dept Agric. at Mayaguez. Of the progeny (40 seedlings), 26 plants have produced strong root systems after some 9 years in the field in soil infested with the fungus. The nature of the hybrids, which flowered at 8 years, is described; it is apparent that backcrossing to *V. planifolia* will be necessary to obtain a commercially worth-while variety.

BARTELS (R.). **Ein Beitrag zum serologischen Nachweis des Y-Virus in der Kartoffel.** [A contribution to the serological demonstration of the Y virus in the Potato.] —*Phytopath. Z.*, **30**, 1, pp. 1–16, 16 fig., 1957. [23 refs.]

At the Institut für Virusserologie, Brunswick, the feasibility of demonstrating potato virus Y by serological methods [**27**, p. 149 *et passim*] was shown by repeated tests on numerous naturally and artificially infected potato varieties and selections to depend neither on the virus strain nor on the host variety alone but on a combination of the two and to be closely correlated with the symptom picture. Thus, according to the virulence of the strain or isolate and the resistance or tolerance of the variety, the plant reacted to infection by severe spot and streak necroses (type 1), well-defined mosaic and isolated streak symptoms (type 2), or faint or masked mottling (type 3). In type 1 plants serological differentiation was only occasionally practicable; in 2 it was effected in some 80% of those with 'raspberry-leaf' or mosaic symptoms but failed when plants were severely damaged; while in type 3 plants virus Y could be demonstrated as easily as virus X, the margin of error being roughly 2%.

LIN (C-K.), HO (H.), WANG (T-P.), & HWO (S-H.). **Observations on the formation of primary foci of late blight in a Potato plantation.**—*Acta phytopath. sinica*, **3**, 1, pp. 19–29, 1 col. pl., 4 fig., 1 graph, 1957. [Chinese. Abs. from English summary.]

Planting slightly diseased tubers at the Salingtze Agricultural Experiment Station, Hopeh Province, indicated that underground infection by late blight [*Phytophthora infestans*: **37**, p. 53] from plant to plant in the same hill is the main source of primary foci for subsequent aerial spread of the disease [cf. **36**, p. 118]. From 789 hills planted with diseased tubers in Peking and Salintze in 1956, only 9 plants were found with stem lesions, 5 of which wilted and died rapidly, and in 1 the lesion healed. Delayed aerial infection is due to the fragility of the diseased source plants and to very low night temperatures in the spring.

TAKASE (N.). **Studies on the resistance to late blight in Potatoes. III. Reaction of specific hybrid Potatoes to three strains of Phytophthora infestans.**—*Jap. J. Breed.*, **6**, 4, pp. 233–236 (29–32), 2 fig., 1957. [Japanese. Abs. from English summary.]

In this further contribution from the Hokkaido National Agricultural Experiment Station [**36**, p. 206; **27**, p. 106] leaves and tubers of 15 [*Solanum*] *demissum* hybrids were inoculated with races H_1, H_2, and H_3 of *P. infestans* in 1954. Almost complete correlation was observed between leaf and tuber resistance. Three categories were distinguished: (*a*) resistant to H_1 and H_2 and susceptible to H_3; (*b*) resistant to H_1 and H_3 and susceptible to H_2; and (*c*) resistant to all three. Tubers were considered resistant when they turned brown at the inoculation site prior to the formation of aerial mycelium.

TOMIYAMA (K.), TAKEMORI (T.), & TAKAKUWA (M.). **Physiological studies on the defence reaction of Potato plant to infection by Phytophthora infestans. V.**

Changes in the acid soluble phosphate compounds fractions in Potato tuber tissue induced by slicing.—*Res. Bull. Hokkaido nat. agric. Exp. Sta.* 72, pp. 8–15, 1 fig., 9 graphs, 1957. [Japanese. Abs. from English summary.]

Further studies in this series [**37**, p. 106] were concerned with the effect of slicing healthy potato tubers; this caused a change in the proportion of acid-soluble phosphate compounds, depending on the thickness of the slice, prior to an increase in oxygen uptake.

McKay (R.), Loughnane (J. B.), & Kavanagh (T.). **Haustoria of Phytophthora erythroseptica in Potato tubers affected with pink rot.**—*Trans. Brit. mycol. Soc.*, **40**, 3, pp. 407–408, 1 pl., 1957.

The occurrence of haustoria in potato tubers infected by *P. erythroseptica* [**13**, p. 180; cf. **33**, p. 46] is described for the first time.

Hildebrand (E. M.). **Rapid symptoms in seedling VII Sweetpotato of a virus always associated with internal cork.**—*Science*, **126**, 3277, pp. 751–753, 2 fig., 1957.

At Beltsville, Maryland, clone VII, a sweet potato seedling from open-pollinated Porto Rico seed from Louisiana, was found to be an excellent indexing host for sweet potato internal cork virus [cf. **36**, pp. 208, 270], whether used in mechanical, graft, or insect transmission experiments. Chlorotic spots appeared on the leaves 7 days after inserting diseased buds.

Hildebrand (E. M.). **Testing Sweetpotatoes for black rot resistance.**—*Plant Dis. Reptr*, **41**, 8, pp. 661–670, 6 fig., 1 graph, 1957.

In experiments at Beltsville, Maryland, to standardize the procedure for testing sweet potatoes for resistance to *Ceratocystis fimbriata* [**34**, p. 249] roots of Sunnyside (resistant), Orange Little Stem, and Yellow Jersey (both susceptible) were wound inoculated with sporulating agar cultures and incubated in moist chambers at 21° C. for 3 weeks. Data were recorded on the diameter of the surface lesion and on the estimated area of lesion surface exposed in transverse section through the root at the inoculation site of the three cultures used in the study. One from Beltsville produced larger surface and internal lesions on the susceptible varieties than did the others; that from Louisiana State University produced slightly larger lesions on Sunnyside than did the Beltsville culture, but significantly larger than that from the University of Maryland.

Suzuki (N.), Tomizawa (C.), & Toyoda (S.). **Behaviour of phosphorus in relation to stimulated respiration of Sweet Potato tissues infected by Helicobasidium mompa.**—*Ann. phytopath. Soc. Japan*, **21**, 4, pp. 175–180, 3 fig., 1 graph, 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

At the National Institute of Agricultural Sciences [Tokyo], Japan, the respiration of resistant sweet potato tissue was stimulated to double the normal rate by infection with *H. mompa*, while the stimulation in susceptible tissue was 3- to 10-fold.

Hwang (L.), Chen (Y-S.), & Hwang (H-Y.). **A preliminary study of Sweet Potato wilt and its control.**—*Acta phytopath. sinica*, **2**, 2, pp. 97–113, 2 pl., 6 graphs, 1956. [Chinese. Abs. from English summary. Received 1957.]

Sweet-potato wilt [cf. **29**, p. 285], studied at the Kwangsi Agricultural College, attacks the fibro-vascular bundles of the plant and infects cuttings and plant parts in close contact with the soil. The infected parts have a water-soaked appearance and later blacken and rot. *Fusarium* spp. and 4 types of bacteria were found associated with the disease, but the part played by each has yet to be determined. The varieties Tai-nung nos. 3 and 46 proved resistant. The disease is spread

with infected planting material. High humidity and high temperature are closely related to its development, air temp. 23·4–28·4° C. and 80% R.H. being optimum for infection.

Riggenbach (A.). **Report of the Plant Pathology Department.**—*Rep. Rubb. Res. Inst. Ceylon, 1956*, pp. 40–48, 1957.

In this report [cf. **36**, p. 57] it is stated that field observations confirmed the view that rubber trees with a heavy pod set are more severely attacked by *Phytophthora palmivora* [**35**, p. 392] than others; the number of spores formed on infected leaves is negligible in comparison with the number on the pods. Root diseases, especially white root (*Fomes lignosus*) [cf. **35**, p. 324; **36**, p. 58], are commonly present in replanted areas. *F. lignosus* was grown successfully on various media, including cow dung. The practice of dipping the uprooted stumps of nursery plants in cow dung solution to prevent drying-out should therefore be abandoned.

All leaves from areas heavily attacked by *Gloeosporium albo-rubrum* [loc. cit.] were affected also by *Oidium heveae* [loc. cit.; **36**, p. 423], in most instances in association with other fungi, especially a species of *Fusarium*, which was cultured. Infection experiments showed that *G. albo-rubrum* is a true parasite, able to attack healthy young leaves and green pods. In laboratory tests, neither sulphur (wettable and non-wettable dust) nor fungicides containing 1% Cu had any effect on the fungus.

Leaching experiments clearly demonstrated that copper dusts adhere much better when applied to wet leaves than to dry ones; there may be at least 20 times as much Cu on the former than on the latter.

Ramakrishnan (T. S.). **Powdery mildew of Rubber caused by Oidium heveae Steinmaan and its occurrence in South India.**—*Rubb. Bd Bull.*, **4**, 2–3, pp. 3–6, 1957.

A brief account of symptoms, factors affecting infection, carry over of the fungus, and control.

Wijbrans (J. R.). **Bliksemschade in jonge Hevea-aanplanten.** [Lightning damage in young *Hevea* plantations.]—*Bergcultures*, **26**, 13, pp. 291, 293, 295, 297, 2 fig., 1 diag., 1957.

Lightning damage to rubber plantations in Indonesia is discussed in some detail. The worst affected are young trees before a continuous canopy has been formed. Commonly, small groups of trees are damaged, some being killed outright. Among the symptoms on damaged but living trees are flow of latex over the whole trunk, or its upper parts; death of bark, the affected parts sometimes following a loose spiral, or apparently occurring at random, being either continuous or interrupted; lesions at the base of the trunk, with bark peeling; and bark splitting, particularly in older trees.

Those parts of the crown which have been killed back are entered by such secondary invaders as *Botryodiplodia theobromae* [**36**, p. 638], *Gloeosporium albo-rubrum*, *Phyllosticta ramicola*, and *Phomopsis heveae*. Canker caused by the *Pythium-Phytophthora* complex commonly follows lightning damage, thus tending to affect restricted groups of trees. Where young grafts have been exposed to a fairly strong discharge cankers develop at soil level on the side where the scion was inserted. Under prolonged damp conditions such cankers spread round the stem, leading to death. In trees which have been damaged but not killed it is essential to cut out the affected parts as soon as possible, to avoid canker.

Hughes (C. G.). **Fiji disease resistance trials.**—*Cane Gr. quart. Bull.*, **20**, 3, pp. 84–86, 1 fig., 1957.

The recurrence of downy mildew (*Sclerospora sacchari*) [**36**, p. 127] in S. Queensland

after an apparent absence of 6 years has emphasized the necessity for continued observation of the reaction of commercial varieties to Fiji disease virus [**36**, p. 455] also. The standards at present used for this purpose are C.P. 29/116, H. 32-8560, M. 1900S, and P.O.J. 2878. Infection is obtained by adjacent planting of diseased setts of the variety Kassoer, which will survive the disease, and some shelter rows of cane are left uncut to carry the vector (*Perkinsiella saccharicida*) over the dry season. In a recent typical trial there were 0–68% diseased stools in the canes under test and 6–66% in the standards.

STEVENSON (G. C.). **Report on a visit to Hawaii.**—*Bull. Brit. W. Ind. Sug. Cane Sta.* 38, 13 pp., 1956. [Received 1957.]

In the section on Pathology and Quarantine (p. 10) it is reported that in Hawaii the local strain of sugarcane mosaic virus [**34**, p. 676] produces on susceptible varieties mild symptoms similar to those of the S. Caribbean strain. The recently observed 'ring-mosaic' symptoms are believed to be connected with mutation in certain varieties and not with a virus.

Experiments on the transmission of chlorotic streak [**36**, p. 351] did not confirm the previous findings in Louisiana [**22**, p. 39] that the leafhopper [*Draeculacephala portola*] can be a vector.

The 'Maui growth failure', characterized by a peculiar stunting and yellowing followed by drying of leaf margins, which predominates on one soil type, is believed to be due to a soil factor.

RAFAY (S. A.). **Position of mosaic disease of Sugarcane.**—*News Lett. Indian Sug. Cane Res.*, **3**, 3, 2 pp., 1957.

In this note on sugarcane mosaic virus in India [cf. **34**, p. 517] it is stated that insects such as *Rhopalosiphum maidis* are well known as vectors [but cf. **30**, p. 629]. In Madras and also in W. Bengal natural transmission is common. Co. 214, hitherto thought to be immune, has now become infected. The disease is negligible in the States of Bihar and Bombay, mild in Uttar Pradesh and West Bengal, and severe in Madras.

CHU (H. T.) & LIN (P.). **Investigation on the stunting disease of N: Co. 310.**—*Rep. Taiwan Sug. Exp. Sta.* 14, pp. 83–92, 1956. [Abs. in *Sugar y Azucar* (formerly *Sugar, N.Y.*), **52**, 11, p. 32, 1957.]

The incidence of ratoon stunting virus is stated to be increasing on the highly susceptible N.Co. 310 sugarcane, the leading variety in Taiwan [**35**, p. 845 and below]. Effective control has been achieved, however, by immersion of the seed pieces for 2 hr. in water at 50° C., which reduced the incidence of infection from 40·8–84·8 to 3·6%. Moreover, in 1955–6 the yield from treated seed pieces was 33·8 and 19·59% higher than that of untreated diseased and untreated healthy, respectively, the latter finding suggesting a stimulatory effect of the hot water on growth and germination. The importance of continual repetition of the treatment is emphasized.

Ratoon stunting disease in Taiwan.—*Cane Gr. quart. Bull.*, **20**, 5, pp. 97–98, 1957. According to the reports of T.T.Lo, pathologist of Taiwan, the percentages of diseased cane in commercial sugarcane varieties affected by ratoon stunting virus [see above] in 1954 were N.Co. 310, 51·5%, F 108, 56·1%, and P.O.J. 2883, 42·4%, entailing losses in yield of up to 27%. The germination of hot-water treated setts varied from 50 to 96%; seed-pieces should be dipped in a mercurial solution after treatment.

STEINDL (D. R. L.). **Alternative hosts of ratoon stunting disease.**—*Cane Gr. quart. Bull.*, **20**, 3, p. 101, 1 fig., 1957.

Recent work has shown that 10 species of grasses (listed) commonly found growing

in cane fields in Queensland can carry sugarcane ratoon stunting virus. They included para grass (*Brachiaria mutica*), *Cynodon dactylon*, and Guinea grass (*Panicum maximum*). None showed symptoms after inoculation, but extracts from all of them subsequently reproduced the disease in inoculated Q 28.

This information is also published in *J. Aust. Inst. agric. Sci.*, **23**, 3, p. 238, 1957.

SHARMA (S. L.). **A new report of a rust (Puccinia kuehnii (Krueg.) Butler) on Erianthus munja.**—*Proc. Indian Acad. Sci.*, Sect. B., **46**, 2, pp. 126–130, 1 fig., 1957.

At the Sugarcane Research Institute, Pusa, Bihar, the identity of *P. kuehnii* [map 215; **37**, p. 111] found on *E. munja* was established by cross-inoculation to *E. arundinaceus*.

STEINDL (D. R. L.). **'Bacterial Mottle', a new disease of Sugar Cane in Queensland.**—*Cane Gr. quart. Bull.*, **21**, 1, pp. 6–8, 3 fig., 1957.

This disease of sugarcane has been called 'root disease', owing to the poor development of the rooting system. The early symptoms consist of creamy white, regular stripes, 1–2 mm. wide, extending from the base of the leaf blade, upwards, and varying in length and number. Orange to rusty-red areas develop later and the symptoms then resemble those of downy mildew [*Sclerospora sacchari*: **37**, p. 180]. As the disease progresses infection becomes systemic, and the young leaves develop an irregular mottling. As they age numerous rusty-red flecks and narrow stripes appear; later the leaves curl inwards and the whole shoot dies.

Side shoots produced at the base give a witches' broom effect and also show the characteristic mottling. Small brown areas of dead tissues occur within badly diseased stems, particularly in the region of the nodes and the growing point. Diseased setts produce only small shoots, which die out after few weeks' growth. The causal organism has been shown to be a bacterium, not yet identified, but possessing many characteristics of *Erwinia*. It is probably carried by flood waters. Trojan and Q 57 proved the most susceptible varieties in the area concerned, but Badila, Comus, Eros, and Q 45 were also attacked.

ABE (T.) & KONO (M.). **Studies on the white root rot of Tea bush IV. On the toxicities of cultural filtrate of the fungus.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 8, pp. 74–80, 2 pl., 1956. [Japanese summary. Received 1957.]

In further cultural studies on *Rosellinia* [*necatrix*: **36**, p. 65] isolate R 1, no direct correlation was found between mycelial weight and toxicity of culture filtrates from different media, nor between osmotic pressure and toxicity. The culture filtrate was toxic to rice germination, and inhibited root growth of cabbage, radish, barley, and rye seedlings. Toxicity was attributed to a thermostable substance with more than two components, one inhibiting root growth at low concentration and the other bud growth at high. The activity towards rice seedlings was the same over pH 5–7 but the filtrate was more toxic to bean [? *Phaseolus vulgaris*] seedlings under acid than alkaline conditions.

ABE (T.) & KONO (M.). **Studies on the anthracnose of Tea bush. II. Physiological characters and pathogenicities of anthracnose fungi isolated from apparently healthy leaves.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 8, pp. 81–88, 2 pl., 1956. [Japanese. Abs. from English summary. Received 1957.]

This further contribution [cf. **36**, p. 65] records that the opt. temp. ranges for *in vitro* growth of *Glomerella cingulata*, *G.* sp., and *Guignardia camelliae* from tea leaves were 24–28°, 28–30°, and 24° C., respectively. The thermal death points for the *Glomerella* spp. were 50° for 5 min. (moist) or 10 min. (dry) and for *Guignardia camelliae* 55° for 5 min. (moist) or 60° for 5–10 min. (dry). All 3 species

survived 30–60 days at −2 to −4°, but growth was inhibited thereafter on transfer to opt. temp. The opt. pH conditions for *G. camelliae* and *Glomerella cingulata* were 5·2–5·8, and for *G.* sp. 5·8–6·8. The growth of all three was inhibited by 1–9 min. exposure to ultra-violet light but was eventually resumed after radiation; *G. cingulata* was induced to form perithecia.

In inoculation tests both hyphae and spores of the 3 fungi were pathogenic to tea leaves, producing indistinguishable symptoms. Some physiological differences were observed between isolates of *G. cingulata* from tea and apple, though the pathogenicities of the two strains to apple were identical.

Benda (G. T. A.). **Infection of Nicotiana glutinosa L. following injection of two strains of Tobacco mosaic virus into a single cell.**—*Virology*, **2**, 6, pp. 820–827, 1956. [Received Dec. 1957.]

At the Virus Laboratory, University of California, Berkeley, a mixture of tobacco mosaic virus and its yellow aucuba strain [**36**, pp. 356, 375, and below] was injected into a single hair cell of a detached seedling leaf of *N. glutinosa*. The ordinary strain was detected alone in 14 of 20 resultant lesions, the aucuba in 1, and both strains in 5. With a single exception, lesions developed only when the inoculated hair remained alive for at least 1 day.

Benda (G. T. A.). **White spots in Nicotiana sylvestris following mixed infection with TMV strains.**—*Virology*, **3**, 3, pp. 601–602, 1 fig., 1957.

In further work on the inoculation of young plants of *N. sylvestris* with the ordinary strain of tobacco mosaic virus and a yellow aucuba strain [see above], the former by itself evoked a systemic green mosaic, the latter producing symptoms frequently restricted to the inoculated leaf or, when systemic, causing a general necrosis. Only rarely does the aucuba strain evoke a limited systemic disease in which a few spreading necrotic areas occur on 1 or 2 systemically infected leaves.

The disease which finally developed when the strains were inoculated together was typical of the green strain alone. On the first systemically infected leaves, however, white spots sometimes appeared, from which the aucuba strain was isolated, while the green strain was isolated from the surrounding green tissue. These spots were most numerous when the strains were introduced as a mixture, fewer when they were inoculated separately in parallel strips on the same half leaf, and fewer still when put into opposite half-leaves or contiguous leaves. In summer, greenhouse conditions seemed most favourable for observing this phenomenon. The frequency of spotting increased with the concentration of virus, and spots were most frequent on the 2nd or 3rd leaf younger than the inoculated one.

Siegel (A.), Ginoza (W.), & Wildman (S. G.). **The early events of infection with Tobacco mosaic virus nucleic acid.**—*Virology*, **3**, 3, pp. 554–559, 2 graphs, 1957.

At the Botany Dept and Atomic Energy Project, University of California, Los Angeles, infection of *Nicotiana glutinosa* by 2 strains of tobacco mosaic virus (U_1 and U_2) was compared with infection by nucleic acid preparations from these strains, the change in sensitivity of the respective infective centres to ultra-violet light being plotted as a function of time after inoculation. With the intact viruses there was a lag period after inoculation ($2\frac{1}{2}$ hr. with U_2; 5 hr. with U_1) in which no change of sensitivity occurred, while with the respective nucleic acids there was little or no lag and the infective centres exhibited identical behaviour. These findings provide evidence, additional to that obtained by chemical means [**36**, p. 132], that the nucleic acid moiety of the tobacco mosaic virus particle is itself capable of initiating infection and must therefore be the repository of the total genetic material of the virus. The lag is interpreted to be a period in which the nucleic acid moiety becomes dissociated from the protein moiety. It may be that

the longer lag with strain U_1 is an expression of a greater resistance to this dissociation.

FRAENKEL-CONRAT (H.). **Degradation of Tobacco mosaic virus with acetic acid.**—*Virology*, **4**, 1, pp. 1–4, 1957.

In further work at the Virus Laboratory, University of California, Berkeley [cf. **36**, pp. 67, and above], it was found that cold 67% acetic acid splits tobacco mosaic virus and precipitates the nucleic acid. Native protein free from nucleic acid or other gross contaminants can be isolated from the supernatant by dialysis.

SCHLEGEL (D. E.). **The stimulatory effect of organic acids on Tobacco mosaic virus multiplication.**—*Virology*, **4**, 1, pp. 135–140, 1957.

At the Dept of Plant Pathology, University of California, acetic, aconitic, α-ketoglutaric, citric, formic, glycolic, fumaric, malic, oxalic, pyruvic, and succinic acids significantly increased tobacco mosaic virus in inoculated leaf disks floating on the solutions [cf. **34**, pp. 617, 754].

HAMERS-CASTERMAN (C.) & JEENER (R.). **An initial ribonuclease-sensitive phase in the multiplication of Tobacco mosaic virus.**—*Virology*, **3**, 1, pp. 197–206, 1 graph, 1957.

At the Laboratory of Animal Physiology, University of Brussels, Belgium, the multiplication of tobacco mosaic virus in detached tobacco leaves was inhibited by infiltrating the leaves *in vacuo* with a solution of ribonuclease but not by simply immersing the leaves in it. The enzymatic activity and virus-inhibiting action of ribonuclease was suppressed by H_2O_2 but not the ability to form complexes with the virus. It was concluded that the effect of the enzyme on virus multiplication was due to its effect on the nucleic acid and not to the formation of enzyme-virus complexes.

KASSANIS (B.). **The multiplication of Tobacco mosaic virus in cultures of tumorous Tobacco tissues.**—*Virology*, **4**, 1, pp. 5–13, 1957.

At Rothamsted Experimental Station the concentration of tobacco mosaic virus in extracts from infected tobacco tumorous tissues (obtained per G. Morel from meristematic tissues of crown galls [*Agrobacterium tumefaciens*] and able to grow without added growth substances) [cf. **29**, p. 167] was about $\frac{1}{30}$ of that usual in sap from leaves of infected tobacco plants grown in soil. In constant conditions the virus concentration of tissues remained constant and uninfluenced by their growth. Increase in the phosphate content of the medium increased the growth of the tissues but reduced virus concentration, the reduction being greater at high than at low concentrations of glucose.

MATSUI (C.). **The electron microscopic observations of Tobacco mosaic virus-infected tissue by ultra-thin section.**—*Virus* (*Japan*), **6**, 4, pp. 357–362, 10 fig., 1956. [Received 1957.]

At Nagoya University, Japan, ultra-thin sections of tobacco leaves infected by tobacco mosaic virus were observed under the electron microscope. In the parenchyma masses of virus rods were seen near disintegrated chloroplasts, but rods or virus-like particles were not found within them. With the evidence available it is not possible to conclude that duplication of virus particles takes place within the chloroplasts.

HITCHBORN (J. H.). **The effect of high temperature on the multiplication of two strains of Tobacco ring spot virus.**—*Virology*, **3**, 1, pp. 243–4, 1957.

In a comparative study of 2 antigenically related strains of tobacco ring spot virus

at the Molteno Institute, University of Cambridge, that of Wingard [**8**, p. 139] with polyhedral particles was unable to multiply at 36° C. and caused no local lesions or systemic infection in tobacco or cowpea at this temperature, while that of Pound [**29**, p. 135] multiplied locally and systemically in inoculated plants at 36°. Tobacco plants infected with Wingard's strain and kept at 18–25° produced local lesions and became systemically infected in 14 days, but after 4 weeks at 36° systemically infected plants became apparently freed from virus. In precipitin tests the precipitate was characteristic of plant viruses with spherical particles. These results show that the ability to multiply at 36° is not confined to plant viruses with rod-shaped particles and that different strains of the same virus may behave differently under these conditions.

Stephen (R. C.). **The influence of planting date on Tobacco growth and on the incidence of Cercospora leaf-spot disease in Southern Rhodesia.**—*Emp. J. exp. Agric.*, **25**, 100, pp. 291–300, 3 graphs, 1957.

Experiments during two seasons showed that early transplanting of tobacco is the most important factor contributing to high yield and low incidence of *C. nicotianae* [**35**, p. 508]. Incidence was lowest in plantings made before 20 Nov. and highest in those of 28 Nov.–12 Dec., decreasing only slightly in those of later dates. Disease-free seedlings were used and the plots were sufficiently isolated from viable spores transmitted from other tobacco by air currents. It is suggested that the source of inoculum was the veld vegetation round the experimental plots, the incidence at any particular period depending on spore concentration.

Factors in the production of healthy Tobacco seedlings.—*Bull. Tob. Res. Bd. Rhod. Nyasald* 6, 32 pp., 22 fig., 1957.

In the section dealing with disease control (pp. 25–28) by R. C. Stephen and J. S. Cole a suggested spray programme for anthracnose [*Colletotrichum tabacum*: **36**, p. 380] is followed by notes on the control of other common tobacco diseases and a compatibility chart for fungicides and insecticides.

Hidaka (Z.) & Murano (H.). **Studies on the streptomycin in plant body and control of bacterial diseases by the surface absorption.**—*Ann. phytopath. Soc. Japan*, **21**, 2–3, pp. 49–52, 1 pl., 1956. [Japanese. Abs. from English summary. Received Oct. 1957.]

In further experiments at the Hatano Tobacco Experiment Station, Japan [**36**, p. 487], complete control of *Pseudomonas tabacum* on tobacco for 10 days after inoculation resulted from one streptomycin spray containing 110 μg./ml. given the day before. With *P. solanacearum* a second spray was required 5 days after inoculation.

Streptomycin was detected in fully developed tobacco leaves 5 weeks after application and was translocated in the phloem and pith but not in the xylem.

Selman (I. W.) & Grant (Sheila A.). **Some effects of nitrogen supply on the infection of Tomato plants with Tomato spotted wilt virus.**—*Ann. appl. Biol.*, **45**, 3, pp. 448–455, 1957.

In studies at Wye College, Kent, susceptibility of tomato plants to spotted wilt virus was increased by raising the nitrogen supply to levels above the optimal for growth. The incubation period was decreased by levels slightly above optimal, but was increased by further applications. The relationship between the incubation period and growth appears to depend on the range and number of the nitrogen levels supplied. Infected plants given more nitrate or ammonium compounds than were required for optimal growth developed abnormal leaf symptoms but no bronzing. These symptoms were ascertained to be primarily related to nitrogen content. Such leaves contained more virus than did bronzed leaves. Mild or abnormal strains

of spotted wilt virus which produce symptoms resembling those associated with levels of nitrogen supply supraoptimal for growth have been reported elsewhere [cf. **27**, p. 113; **33**, p. 702].

Edgington (L. V.) & Walker (J. C.). **Influence of soil and air temperature on Verticillium wilt of Tomato.**—*Phytopathology*, **47**, 10, pp. 594–598, 2 graphs, 1957.

This paper presents in greater detail information already noticed [**36**, p. 430] on the growth of the strain of *V. albo-atrum* producing pseudo-sclerotia (also known as *V. dahliae*) [**29**, p. 333] and that producing dark, resting mycelium ('dauer-mycelium') [cf. **22**, p. 323; **34**, p. 111]. Stem temp. readings showed the 'equivalent temp. level' (that midway between soil and air temp.) to be some 12 cm. above the soil. Light intensity, transpiration, and equivalent temp. level were found to be closely correlated; when soil temp. is less than that of air, it has a greater effect on internal stem temp. by day than by night, owing to the cooling influence of the transpiration stream.

White (D. P.) & Leaf (A. L.). **Forest fertilization.**—*Bull. World For. Ser.* (*Techn. Bull. Univ. Coll. For. Syracuse Univ.* 8) 2, 305 pp., 2 col. pl., [? 1957].

Among these 700 abstracts of papers on the use of fertilizers and soil amendments in forestry are some concerned with plant pathology.

Roberts (K.). **A list of fungi collected in Wattle plantations.**—*Rep. Wattle Res. Inst. Univ. Natal. 1956–57*, pp. 26–28, 1957.

Fungi collected from wattle [*Acacia* spp.] plantations, mostly in Natal, are listed in 5 habitat groups, each subdivided according to frequency. Most of the species are woodland saprophytes. The most abundant and widespread were *Amauroderma rude* and *Schizophyllum commune* on living trees and fresh and dead stumps.

Banerjee (S.). **On the biology of Auricularia auricula-judae (Linn.) Schroet. causing rot in Elder (Sambucus nigra L.).**—*Proc. nat. Inst. Sci. India* B, **22**, 6, pp. 317–334, 4 pl., 1 fig., 1957.

This is a detailed study of *A. auricula-judae* in the laboratory and in the field in Scotland and on the rot it causes in elder. Experimental inoculation of healthy *S. nigra* and *S. racemosa* proved that the fungus can attack living tissues through wounds in the bark but the growth of the mycelium is very slow. The fungus prefers to grow in the wood and may cause severe heart rot. The spores can germinate on freshly cut surfaces of young elder twigs and can penetrate the host tissue. The fungus can be considered a wound parasite on normal vigorous trees.

Wood block tests indicated that elder wood is non-resistant to decay by *A. auricula-judae*, the average loss in weight being 12·3 and 25·4% after 4 and 8 months, respectively.

Boyce (J. S.). **Oak wilt spread and damage in the Southern Appalachians.**—*J. For.*, **55**, 7, pp. 499–505, 1 fig., 1 graph, 2 maps, 1957.

During studies by the Southeastern Forest Experiment Station of the spread of oak wilt (*Ceratocystis fagacearum*) [**35**, p. 402; **36**, p. 560; **37**, p. 118] in N. Carolina and Tennessee during 1951–56 and the damage caused, 250 infection centres were recorded, the oldest active ones dating back to 1945. No increase in number of new centres/year was observed in 1955 and 1956 when compared with those starting during the preceding four years. The oldest centres recorded were 10 years old and averaged 0·4 acre with 21 dead or dying trees in each. At 114 centres the average infection from the time of inception until they were detected, regardless of the year of origin, was 1–2 trees/year.

Of the 52 centres observed for 3 years, nearly half ceased activity naturally, despite the presence of living trees. Only 2% of the wilting trees belonged to the white oak group. In 4 years 23% of all oaks became infected in plots of 50 ft. radius having at least 1 wilting tree at the start. In plots where stumps of felled and sprayed infected centre trees were poisoned with ammate (ammonium sulphamate) disease incidence after 2 years was lower than in the untreated plots.

At 163 infection centres 96% of the affected trees were within 50 ft. of probable wilt-killed trees and 75% were less than 30 ft. away. Out of 40 poisoned oaks 6 were shown by copper sulphate tests to be root grafted to nearby oaks, 3 grafts between red and white oaks being noted. Observations of single tree (overland) infections over a 3-year period revealed 80% of the trees to be 11 in. d.b.h. or larger and infection centres to be clustered. The spread into disease-free areas was relatively small. Sharp reductions in the number of new infection centres followed the cutting down of wilting trees in the summer, spraying them with 0·5% gamma BHC plus 2% pentachlorophenol in fuel oil, and poisoning the stumps with ammate.

Igmándy (Z.). **Csersorjerdök tőkozhadast okozvő gombái.** [Fungi causing butt rot in *Quercus cerris* coppice.]—*Erdőmérnöki Főiskola Közleményei, Sopron* [*Mitt. berg.- u. Lüttenmn. Abt., Sopron*], *1955*, pp. 131–47, 1955. [Abs. in *For. Abstr.*, **18**, 4, p. 515, 1957.]

The chief pathogens causing butt rot of oak [in Hungary], *Poria obliqua* [see below] and *Polyporus cuticularis*, are described as difficult to distinguish macroscopically; the former plays the decisive role. In lesions due to animals browsing at the root collar, *P. irpex* has been associated with these two fungi. The rot spreads across as well as up the stem and it may be a cause of false heart.

Haracsi (L.) & Igmándy (Z.). **A csertapló (Xanthochrous obliquus (Pers.) B. et G.) Előfordulása lombfáinkon.** [The occurrence of *Xanthochrous obliquus* (Pers.) B. & G. on broad leaved species in Hungary.]—*Erdőmérnöki Főiskola Közleményei, Sopron* [*Mitt. berg.- u. Lüttenmn. Abt., Sopron*], *1956*, 1, pp. 73–87, 1956. [Abs. in *For. Abstr.*, **18**, 4, p. 575, 1957.]

This paper deals with taxonomy, parasitism and various forms of *Poria obliqua* [see above]. The sexual and asexual forms vary greatly with the different hosts. Photographs illustrate attacks on a number of tree species. The damage to oak (*Quercus cerris*) is considerable.

Viennot-Bourgin (G.) & Taris (B.). **Les maladies du Peuplier.** [The diseases of Poplar.]—*Agriculture, Paris*, **18**, 174, pp. 319–322, 3 fig., 1955. [Received 1957.]

Brief, practical notes are given on the symptoms, causes, and control of the principal fungal and bacterial diseases affecting poplars in Europe [cf. **32**, p. 595; **34**, p. 619; **35**, p. 560, *et passim*].

Truszkowska (Mme W.). **Obserwacje niektórych grzybów pasożytniczych i saprofitycznych na pędach Populus euramericana marilandica Bosc. w Turwi (woj. poznańskie).** [Observations of some fungi parasitic and saprophytic on young trees of *Populus euramericana marilandica* Bosc. at Turew (Poznań province).] —*Acta Soc. Bot. Polon.*, **26**, 2, pp. 257–269, 12 fig., 1957. [French summary.]

The following fungi were observed during 1953–56 on young poplar (*P. e.* [var.] *marilandica*) plantings at Turew and in the Kornik nursery, Poland: *Lophiotrema nucula*, *Lophidium* [*Platystomum*] *populi*, *Cytosporella populina*, *Valsa sordida* [**35**, p. 646], *V. nivea*, *Cryptosphaeria populina*, *Phoma crepini*, *Cytospora nivea* [cf. **33**, p. 509], *Dothichiza populea* [map 344], *Coryneum populi*, and *Tubercularia vulgaris*. These fungi are stated to be commonly distributed on poplars in Poland.

Butin (H.). **Über die Hauptfruchtform von Dothichiza populea Sacc. et Briard.** [On the perfect state of *Dothichiza populea* Sacc. & Briard.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **9**, 5, pp. 69–71, 2 fig., 1957.

Following the discovery of perithecia of *Cryptodiaporthe populea* in close association with pycnidia of *D. populea* [**36**, p. 289] on a bark canker of poplar, the author conducted studies at the Institut für Forstliche Mykologie und Holzschutz, Hann. Münden, which showed that these are states of the same fungus. Ascospores of *C. populea* in culture on malt agar yielded mycelium identical in form and colour with that developing from conidia of *D. populea*; single ascospore cultures on sterile poplar twigs developed *Dothichiza* pycnidia. Furthermore, twig cultures of *D. populea* produced, in addition to conidia, perithecia identical with those of *C. populea*, except that they were sterile. In herbarium specimens of *C. populea* the imperfect state was commonly associated with it.

Bakshi (B. K.). **Heart rots in relation to management of Sal.**—*Indian For.*, **83**, 11, pp. 651–661, 3 pl. (16 fig.), 1957.

From the Forest Research Institute, Dehra Dun, the author reports that sal (*Shorea robusta*), in its extensive and varying habitat in India, is affected by heart rot [cf. **36**, p. 433] due to 3 major fungi: *Fomes caryophylli* [**35**, p. 53], *Hymenochaete rubiginosa* [**32**, p. 158], and *F. fastuosus* [**36**, p. 432], which cause serious economic loss. Trees between 15 and 35 years are mostly susceptible to attack by these fungi, whose entry occurs through wounds. In many cases there are no external symptoms. For each fungus the author gives details of symptoms and spread with recommendations for control.

Bazzigher (G.). **Pilzkrankheiten in Aufforstungen.** [Fungus diseases in young plantations.]—*Kurzmitt. schweiz. Anst. forstl. Versuchsw.* 12, 3 pp., 2 pl., 1 graph, 1956. [Abs. in *For. Abstr.*, **18**, 4, p. 513, 1957.]

The chief pathogenic fungi on young conifer plantations in the [Swiss] alps include *Herpotrichia nigra*, *Botrytis cinerea*, and *Cucurbitaria piceae* on spruce buds, and *Phacidium pinicembrae*, causing needle cast on snow-covered branches of *Pinus cembra* and resulting in considerable losses near Avers-Cresta. The temperature requirements for *Phacidium pinicembrae* in the laboratory resemble those of *H. nigra* (range 0–30° C., opt. 15°).

Mielke (J. L.). **The yellow witches' broom of subalpine Fir in the Intermountain region.**—*Res. Note Intmtn For. Exp. Sta.* 47, 5 pp., 1957.

An epidemic of *Melampsorella caryophyllacearum* [cf. **17**, p. 478; **22**, p. 333] in subalpine fir (*Abies lasiocarpa*) in the southern part of the Intermountain Region of Utah is reported. The rust is known in Canada and through all the western U.S.A. excepting Arizona and Nevada. Alternate hosts are *Cerastium* and *Stellaria* spp. The fungus is also found in the Intermountain region on white fir (*A. concolor*) and grand fir (*A. grandis*), but *A. lasiocarpa* is the most common host. The disease is particularly destructive to seedlings and saplings and causes high mortality in some areas. Heavily diseased trees may bear 30–50 brooms. The epidemic has been in progress for about 25 or more years, and some unknown factor is considered to have been responsible for its intensification. Possibly the alternate hosts have become more plentiful.

Roth (L. F.), Trione (E. J.), & Ruhmann (W. H.). **Phytophthora induced root rot of native Port-Orford-Cedar.**—*J. For.*, **55**, 4, pp. 294–298, 3 fig., 1 map, 1957.

This information on root rot (*P. lateralis*) of *Chamaecyparis lawsoniana* in Oregon has already been noticed from another source [**36**, pp. 363, 505]. Disease symptoms

have so far not been observed in scattered old-growth trees, damage at present being limited to trees in and near towns and along the main roads.

HUBER (B.) & KELLER (H.). **Eine wenig beachtete Lärchenkrankheit (Sclerophoma pithyophila).** [A little-noticed Larch disease (*Sclerophoma pithyophila*).]—*Forstarchiv.*, **27**, 3, pp. 71–73, 1956. [Abs. in *For. Abstr.*, **18**, 3, p. 370, 1957.]

S. pithyophila [cf. **36**, p. 797] was found causing a bark canker on larch (*Larix decidua*) near Munich.

MOSS (V. D.). **Acti-dione treatment of blister rust trunk cankers on western White Pine.**—*Plant Dis. Reptr*, **41**, 8, pp. 709–714, 2 fig., 1957.

In the Coeur d'Alêne National Forest, Idaho, application of 150–600 p.p.m. actidione in oil to the cut surface of wounds on *Pinus monticola* after the excision of blister rust (*Cronartium ribicola*) [**37**, p. 121] cankers proved effective in killing mycelium in the perimeter of the wounds. To avoid weakening the trees, bark removed from the diseased trunk to expose mycelium for treatment should not exceed half the circumference of the trunk at any one point. Should the margin of a canker extend beyond that, the bark at the edge or slightly beyond the surface discoloration should be slit longitudinally to expose the mycelium and the preparation applied.

MIELKE (J. L.). **The Comandra blister rust in Lodgepole Pine.**—*Res. Note Intmtn For. Exp. Sta.* 46, 8 pp., 1957. [25 refs.]

Cronartium comandrae [**18**, p. 73] is widely spread in North America and has recently become epidemic on lodgepole pine [*Pinus contorta* var. *latifolia*], hitherto regarded as only an occasional host. In the western States *Comandra livida* and *C. umbellata* are alternate hosts. Confined to the hard pines, this rust attacks some 12 different species including *P. ponderosa*. Cankers on lodgepole pine originate on needle-bearing twigs and stems, though whether entry is by the needles or through young bark is not known. Spindle-shaped swellings are formed on branches and trunks of young trees, but on older trunks they may be constricted or atrophied. Trunk cankers seldom exceed 3½ ft. in length.

Considerable damage to ponderosa pine had been reported in the past, but only recently has the rust become destrnctive to lodgepole pine, in Idaho, Utah, and Wyoming, where from 50 to 98% infection has been reported, intensification of the disease having started some 15–20 years ago. Spread of the rust from *Comandra* to lodgepole pine over distances of 1–2 miles is not uncommon. The presence of the rust encourages bark removal by rodents.

MORIONDO (F.). **Ricerche sulla Melampsora pinitorqua Rostr. in Italia.** [Researches on *Melampsora pinitorqua* Rostr. in Italy.]—*Ann. Accad. ital. Sci. for.*, **5**, pp. 263–282, 8 fig., 6 graphs, 1 map, 1956. [40 refs. French summary. Received 1957.]

A detailed account is presented of the epidemiology of *M. pinitorqua* [*M. tremulae*] on pine in the forest of Feniglia, Italy [**35**, p. 732]. As the pines grew the attacks lessened, probably because the tops were in moving air in which sea salt was present.

MORIONDO (F.). **Osservazioni sulla biologia di Melampsora pinitorqua Rostr. sul litoral tirrenico.** [Observations on the biology of *Melampsora pinitorqua* Rostr. on the Tyrrhenian coast.]—*Monti e Boschi*, **8**, 1, pp. 31–35, 4 fig., 1957. [French and English summaries.]

The recent outbreak of *M. pinitorqua* [*M. tremulae*: see above and below] in young plantings of *Pinus pinea* in the forest of Feniglia [near Rome] was apparently

favoured by the proximity of poplars. Pine, ocally, is normally only an occasional host, as the lack of rain hinders the germination of the teleutospores, while spread of basidiospores and the infection of pine shoots appear to be possible only in areas sheltered from the prevailing sea winds and in the wetter parts of the dunes. Thus, the pines remained virtually unaffected until some were planted in a low-lying, wet area exposed to the wind from inland, where poplars were widely infected. The young pines were rapidly attacked and the disease was made worse by the fact that their first two years (1950–51) were exceptionally wet.

Species of pines affected by *M. tremulae* in Italy include also *P. sylvestris*, *P. pinaster*, and (in the province of Florence) *P. nigra*; the last-named is a new record for Italy.

Moriondo (F.). **Osservazioni sulla diffusione della ruggine curvatrice del Pino in Italia.** [Observations on the spread of the twist rust of Pine in Italy.]—*Ric. sci.*, **27**, 2, pp. 405–411, 1957. [French, English, and German summaries.]

The author considers the various parts of Italy in which outbreaks of *Melampsora pinitorqua* [*M. tremulae*: see above] have occurred on pine, and concludes that the disease first appeared in the country long ago, when the prevailing conditions probably favoured its development. At present, spread on the mainland is dependent upon the distribution of the two hosts and the climate.

Derr (H. J.). **Effect of site treatment, fertilization, and brownspot control on planted Longleaf Pine.**—*J. For.*, **55**, 5, pp. 364–367, 2 fig., 1957.

Experiments have been carried out in central Louisiana since 1948–9 on the control of brown spot needle blight (*Scirrhia acicola*) of *Pinus palustris* [**34**, p. 197]. Growth is greatly retarded by the disease, extending the grass stage, sometimes to 20 years or more. Fermate was ineffective in the 1st year and was replaced by 4–5–50 Bordeaux mixture, which proved very effective, two applications (May and Nov.) in the 2nd year and one in May in the 3rd and 4th reducing the infection to 5% and enabling over 75% of the surviving stand to start height growth, which was improved, in the 4th and 5th year. The effect of spraying on survival was only slight in the first 4 years of the experiment, average survival of sprayed seedlings dropping from 84·4 to 82·6%, the corresponding figures on unsprayed plots being 82·7 and 78·6, thus confirming that at least three consecutive annual defoliations are required to kill a seedling [**23**, p. 506].

When brown spot is controlled by a spray, surface cultivation to reduce grass competition, which otherwise exposes mineral soil and accelerates brown spot infection, thereby offsetting the benefits of spraying, results in a somewhat increased growth. After 4 years of treatment with Bordeaux mixture nearly 90% of the sprayed seedlings were actively growing or ready to start, compared with 73% of the unsprayed. Eight months after the final spraying less than 6% of sprayed seedlings in the two highest vigour classes on all site treatments were severely infected, as against over 56% of the same classes unsprayed. An examination in the 7th year revealed the ability of sprayed seedlings to grow out of the disease, 748 trees/acre growing actively in the sprayed plots as against 316 in the unsprayed. A similar ratio of control had been obtained elsewhere by prescribed burning instead of spraying (*J. For.*, **45**, pp. 503–507, 1947). If infection is left unchecked the plantations become ragged and understocked.

Gibson (I. A. S.). **Armillaria root rot.**—*Rep. For. Dep. Kenya, 1954–55*, p. 20, 1957. [Abs. in *For. Abstr.*, **18**, 4, p. 514, 1957.]

In a survey for *A. mellea* [**33**, p. 16; **37**, p. 116] in Kenya pine plantations *Pinus canariensis* was found to be the most susceptible and *P. halepensis* the least with *P. patula* and *P. radiata* intermediate; plantations on grassland sites had little

infection, while sites carrying bamboo, indigenous forest, or previous plantations were infested to a certain extent. The age of the plantation had no bearing on susceptibility.

MOLIN (N.). **Om Fomes annosus spridningsbiologi.** [Infection biology of *Fomes annosus.*]—*Medd. Skogsforsk. Inst., Stockh.*, **47**, 3, 36 pp., 1957. [Abs. in *For. Abstr.*, **18**, 4, p. 514, 1957.]

Seven of 10 young pines infected by *F. annosus* [**33**, p. 190], examined [in Sweden] 10 years after planting in an area previously carrying infected spruce, had roots touching those from infected spruce stumps. Infection (apparently aerial) developed in the upper parts of 11% of the spruce and 5·6% of the pine stumps left after thinning; in spruce incidence increased with the severity of thinning. Laboratory tests proved that basidiospores of the fungus can pass through layers of soil and sand 20–40 cm. thick and germinate on wood underneath. *F. annosus* and other fungi failed to grow on various untreated soils but grew on heat sterilized ones. The inhibitory agents, apparently of biological origin, were unstable in aqueous solution, and most stable at pH 5–5·5.

SCHEFFER (T. C.). **Decay resistance of Western Red Cedar.**—*J. For.*, **55**, 6, pp. 434–442, 2 fig., 1 diag., 2 graphs, 1957.

At the Forest Products Laboratory, Madison, Wisconsin, decay tests with heartwood specimens from 67 trees of *Thuja plicata* from different elevations and areas stretching some 500 miles inland from the Pacific coast showed that resistance to *Lenzites trabea* [**36**, pp. 433, 441], *Fomes subroseus*, [**36**, p. 437], and *Lentinus lepideus* [**35**, p. 337] was in all respects uniformly high. Resistance to *Poria incrassata* [**35**, p. 136] and *P. monticola* [cf. **34**, p. 9] was quite variable with outer heartwood from at least 9% of the trees exhibiting only moderate resistance. The variation was independent of the growing site or the rate of wood growth, but the outer heartwood tended to be more resistant to *P. incrassata* with increasing diameter. Heartwood resistance within individual trees varied, being progressively greater from the inside to the outside and from the upper to the lower part of the trunk. The radial differences were greatest in trunk sections with the most resistant outer heartwood, but they apparently reach their maximum where large diameter and resistant outer heartwood are combined. Wood colour in general is not indicative of decay resistance. The frequent differences in resistance between adjacent zones of wood suggested a local, irregular distribution of the decay-controlling extractives.

To attempt to select western red cedar products for superior decay resistance is not practicable or necessary, except for split fence posts, which could be taken from the outer heartwood of the lower trunks of large trees. Loss of decay resistance in the heartwood is stated to occur through leaching and possibly through chemical changes in the preservative extractives as the heartwood ages. Marked losses in heartwood resistance to all these fungi except *P. incrassata* had taken place in poles that had been in service 21–29 years.

ETHERIDGE (D. E.). **Comparative studies of Coryne sarcoides (Jacq.) Tul. and two species of wood-destroying fungi.**—*Canad. J. Bot.*, **35**, 4, pp. 595–603, 1 pl., 1957.

In cultural studies at the Forest Biology Laboratory, Calgary, Alberta, *Coryne sarcoides* [**37**, p. 120], *Polyporus tomentosus*, and *Coniophora puteana* produced cellulases and polyphenol oxidases, but only *P. tomentosus* oxidized lignin. In laboratory tests *Coryne sarcoides* did not appear to be able to cause decay [**35**, p. 799].

Hicock (H. W.) & Olson (A. R.). **Highway post survey. A 1956 progress report.**—*Circ. Conn. agric. Exp. Sta.* 196, 12 pp., 1956. [Received 1957.]

This supplement to an earlier bulletin on the treatment of wooden posts used in highway fencing [**35**, p. 567] includes data from the 1955 inspection. The best results were obtained with red and southern yellow pine when creosote was applied under pressure at 6 lb./cu. ft. The same treatment of hardwoods was much less satisfactory.

Chitzandis (Anna). **Species of Septoria on the leaves of Pistacia vera L. and their perfect states.**—*Ann. Inst. phytopath. Benaki,* **10**, 1–2, pp. 29–44, 3 pl., 1956. [Received 1957.]

A study was made at the Agricultural College of Athens of the *Septoria* spp. on pistachio leaves in Greece [**15**, p. 556; cf. **32**, p. 287]. *S. pistacina* and *S. pistaciarum,* the symptoms they produce, and growth in culture are described comparatively, and their taxonomy, together with that of *S. pistaciae,* is discussed. Perithecia of the two first-named were found on the leaves and are described as representing new species of *Mycosphaerella, M. pistacina* with ascospores 26·2–40 $\times$ 3·2–4·8 μ and *M. pistaciarum* 18·3–30·2 $\times$ 3·3–4·8 μ.

Colhoun (J.). **A technique for examining soil for the presence of Plasmodiophora brassicae Woron.**—*Ann. appl. Biol.*, **45**, 3, pp. 559–565, 1957.

A technique evolved at the Queen's University of Belfast demonstrated within 5 weeks whether or not an area of land was contaminated with *Plasmodiophora brassicae* [cf. **36**, p. 452] and indicated the degree of infection.

Small, random samples (50) were collected with a trowel (first washed, together with the operator's hands, in alcohol) from the top 6 in. of soil over an area up to 1 acre (a composite sample should not represent more than 2 acres). Each composite sample, in a sterilized sack, was dried until it could be sieved readily, but not dried excessively, thoroughly mixed by hand, and the pH of half the sample adjusted with CaOH if desired. The soils were brought to 70% of the max. water-holding capacity and maintained so by watering on alternate days; if lime was added, 5 days were allowed to elapse between the adjustment of the moisture content and planting.

Enfield Market cabbages were used as test plants, raised in sterilized compost from disinfected seed. After 4 or 5 weeks' growth from transplanting it was possible to divide the plants into 2 categories, healthy and bearing macroscopically visible symptoms of club root; the latter was divided into 4 sub-groups according to the severity of the attack.

Ruizhkova (Mme A. S.). О связи устойчивости растений к заболеванию с питанием и их биохимическим составом. [On the connexion between the disease resistance of plants, nutrition, and their biochemical composition.]—Агробиология [*Agrobiology, Moscow*], *1957*, 3, pp. 129–131, 1957.

At the Moscow Branch of the Pan-Soviet Scientific Research Institute of Agricultural Microbiology, U.S.S.R., a study was made of bacteriosis (*Xanthomonas campestris*) [**35**, p. 255] in inoculated cabbage seedlings, grown in water culture under various nutritive conditions. Resistance was very complex and related to the general activity of the plant. Under certain conditions, as in plants receiving different forms of N (ammonium sulphate, calcium nitrate, and ammonium nitrate), resistance increased with sugar content. In those receiving ammonium sulphate and ammonium nitrate an increase in soluble N was associated with a higher degree of infection. A connexion between the content of protein N and degree of infection was noticed only in the experiment with calcium nitrate.

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